

Disclaimer: Information contained in the report addresses environmental conditions only and is not the official South Florida Water Management District operations recommendation or decision.

## **M E M O R A N D U M**

**TO:** John Mitnik, Chief, Engineering and Construction Bureau  
Paul Linton, Administrator, Water Control Operations Section

**FROM:** SFWMD Staff Environmental Advisory Team

**DATE:** June 14, 2016

**SUBJECT:** Weekly Environmental Conditions for Systems Operations

### **Summary**

#### Kissimmee

On Sunday, stage in East Lake Toho was 0.6 feet below schedule; Lake Toho was 0.5 feet below schedule and Kissimmee-Cypress-Hatchineha was 0.8 feet below schedule. Over the past week, discharge at S65 averaged 3,940 cfs and at S65A 5,649 cfs; discharge at S65E averaged 5,255 cfs. Tuesday morning discharges: S65 ~3,368 cfs; S65A ~5,324 cfs; S65C ~7,027 cfs; S65E ~8,543 cfs. The dissolved oxygen (DO) sag in the Kissimmee River continued although mean daily DO increased above 2 mg/L for a single day before declining again; mean daily values have been below 2 mg/L for 22 days and below 1 mg/L for 15 days. DO in the Kissimmee River averaged 1.44 mg/L over the past week and 1.19 mg/L on Sunday. Kissimmee River mean floodplain depth on Sunday was 3.12 feet.

#### Lake Okeechobee

Lake Okeechobee is at 14.73 feet NGVD having risen 0.33 feet over the past week despite continued large volume releases through S77 and S308. The Lake remains in the Low Flow Sub-band. The wading bird nesting season appears to have drawn to a close and only five active snail kite nests remain on the Lake. Lake levels are too high for this time of year and there is a potential for negative impacts to apple snail reproduction and submerged aquatic vegetation and an increased likelihood of cyanobacterial blooms.

#### Estuaries

With the increase in Lake Okeechobee stage and high watershed flow due to Tropical Storm Colin, releases from the Lake to the estuaries increased compared to last week. In the St. Lucie Estuary, total freshwater inflow almost doubled compared to last week, averaging 4,638 cfs. Flow from the Lake was 1,160 cfs (25% of total flow). Salinity decreased compared to last week throughout the estuary, and the seven-day average salinity remained in the poor range for adult oysters at the US1 Bridge. In the Caloosahatchee Estuary, total freshwater inflow increased compared to last week and averaged 11,497 cfs. Flow from the Lake was 3,389 cfs (29% of total flow). Salinity conditions in the upper estuary are suitable for tape grass. At the Cape Coral Bridge, salinity remained in the poor range for adult oysters but remained in the good range at the Shell Point and Sanibel monitoring stations. The 30-day average salinity at the I-75 Bridge is below 5.

#### Stormwater Treatment Areas

Over the past week, the STAs/FEBs received approximately 54,629 acre-feet of inflows; 3,600 acre-feet came from Lake regulatory releases. The total amount of Lake regulatory releases sent to the STAs/FEBs in WY2017 (since May 1, 2016) is approximately 22,000 acre-feet. Stages in the STAs rose as a result of recent rains, so most STA cells are currently above target depths. Operational restrictions are in place for vegetation rehabilitation in STA-1E, STA-1W, STA-3/4 and STA-5/6 and

structure repairs are underway in STA-1E. In addition, there are still birds nesting (either endangered species or migratory species) in STA-1E, STA-1W, STA-2, and STA-5/6. This week, if 2008 LORS recommends Lake releases to the WCAs and the conditions allow, releases will be sent to the A-1 FEB; discharge from A-1 FEB will be sent to STA-2 and STA-3/4.

### Everglades

Water levels rose this week with rainfall that ranged between one to three inches. High water levels throughout the Everglades have eliminated foraging, so any nesting birds would have to forage outside the Everglades. The 30-day moving average salinity at the Florida Bay MFL site remains low at 6.2 psu and the cumulative annual inflow from the five creeks into Florida Bay is 265,097 acre-feet. Florida Bay salinities are within 5 psu of their long-term averages.

## **Weather Conditions and Forecast**

Scattered showers/storms over the interior and north of the Lake mid-afternoon through 10pm. Drier air is evident in morning balloon data over southeast Florida. Look for the seabreeze to get a slow start as it moves inland where it should collide with the west coast seabreeze late afternoon. In general, expect a below average coverage of storms today through the end of the week with the focus shifting to southeast Florida tomorrow and Thursday. Rains are likely to increase significantly as we move into the weekend as a trough drops southward over the peninsula.

## **KISSIMMEE BASIN**

### **Kissimmee Basin Rainfall**

The Upper Kissimmee Basin received 1.61 inches of rainfall in the past week and the Lower Basin received 4.03 inches (SFWMD Daily Rainfall Report 06/14/2016).

### **Upper Kissimmee Basin**

Stages and departures in the Kissimmee Chain of Lakes (KCOL) are shown in Table1.

**Table 1.** Departures from KCOL flood regulation (F) or temporary schedules (T, A, or S) (feet NGVD). Discharge and stage data are provisional real-time data from SFWMD OASyS DualTrend; reported values are averages through midnight of the Sunday prior to the report date unless otherwise specified.

| Report Date: 6/14/2016                         |                |   |                                |                      |           |  | Sunday Departure (feet) |        |         |         |         |        |        |
|--|----------------|---|--------------------------------|----------------------|-----------|--|-------------------------|--------|---------|---------|---------|--------|--------|
| Water Body                                     | Structure/Site | Discharge (cfs),<br>week's<br>average** | Stage<br>Monitoring<br>Site*** | Lake Stage<br>(feet) | Schedule* | Regulation (R)<br>or Target (S or<br>T) Stage (feet) | 6/12/16                 | 6/5/16 | 5/29/16 | 5/22/16 | 5/15/16 | 5/8/16 | 5/1/16 |
| Lakes Hart and<br>Mary Jane                    | S62            | 42                                      | LKMJ                           | 60.0                 | R         | 60.0   | 0.0                     | -0.5   | -0.1    | 0.2     | 0.0     | 0.0    | -0.1   |
| Lakes Myrtle,<br>Preston, and Joel             | S57            | 0                                       | S57                            | 60.6                 | R         | 61.0   | -0.4                    | -0.9   | 0.0     | 0.2     | -0.1    | 0.0    | 0.0    |
| Alligator Chain                                | S60            | 0                                       | ALLI                           | 62.4                 | R         | 63.2   | -0.8                    | -1.2   | 0.0     | 0.2     | 0.0     | 0.1    | -0.1   |
| Lake Gentry                                    | S63            | 0                                       | LKGT                           | 60.2                 | R         | 61.0   | -0.8                    | -1.4   | 0.0     | 0.3     | 0.0     | 0.0    | 0.0    |
| East Lake Toho                                 | S59            | 703                                     | TOHOE                          | 55.9                 | R         | 56.5   | -0.6                    | -0.6   | 1.0     | 0.8     | 0.7     | 0.7    | 0.3    |
| Lake Toho                                      | S61            | 1819                                    | TOHOW,<br>S61                  | 53.0                 | R         | 53.5   | -0.5                    | -0.5   | 1.1     | 1.0     | 0.8     | 0.8    | 0.3    |
| Lakes Kissimmee,<br>Cypress, and<br>Hatchineha | S65            | 3940                                    | LKISSP,<br>KUB011,<br>LKISSB   | 50.2                 | R         | 51.0   | -0.8                    | -0.8   | 1.6     | 1.9     | 0.9     | 0.8    | 0.0    |

\* T = temporary schedule, R = USACE flood control schedule, S = temporary snail kite schedule, A = projected ascension line, N/A= not applicable or data not available.

\*\* Seven-day average of weighted daily means through Sunday midnight.

\*\*\* Names of in-lake monitoring sites and structures used to determine lake stage; if more than one site is listed, an average is reported.

DATA ARE PROVISIONAL

## Lower Kissimmee Basin

Discharges and stages at Lower Basin structures are shown in Table 2. SFWDAT depth maps for the Phase I restoration area are shown in Figure 12. Kissimmee River floodplain stages at selected stations are shown in Figure 13.

**Table 2.** Mean weekly discharge at S-65x structures, and mean weekly Phase I area river channel dissolved oxygen and floodplain mean water depth. Discharge and stage data are provisional real-time data from SFWMD OASyS DualTrend; reported values are averages through midnight of the Sunday prior to the report date unless otherwise specified.

| Report Date: 6/14/2016      |                       | Weekly Average**       |         |        |         |         |         |        |        |         |         |         |
|-----------------------------|-----------------------|------------------------|---------|--------|---------|---------|---------|--------|--------|---------|---------|---------|
| Metric                      | Location              | Sunday's 1-day average | 6/12/16 | 6/5/16 | 5/29/16 | 5/22/16 | 5/15/16 | 5/8/16 | 5/1/16 | 4/24/16 | 4/17/16 | 4/10/16 |
| Discharge (cfs)             | S-65                  | 3452                   | 3940    | 2899   | 4304    | 2029    | 1480    | 1091   | 1125   | 1775    | 1812    | 3289    |
| Discharge (cfs)             | S-65A                 | 6099                   | 5649    | 3348   | 6187    | 4379    | 1352    | 1143   | 925    | 1656    | 1710    | 3395    |
| Discharge (cfs)             | S-65C                 | 7307                   | 5091    | 4792   | 6914    | 3320    | 1603    | 1337   | 1543   | 2082    | 2759    | 4387    |
| Headwater stage (feet NGVD) |                       | 34.3                   | 34.1    | 33.9   | 34.2    | 34.3    | 34.1    | 34.3   | 34.0   | 34.1    | 34.0    | 34.0    |
| Discharge (cfs)             | S-65D****             | 8950                   | 5471    | 5186   | 7868    | 2979    | 1641    | 1391   | 1584   | 2132    | 2872    | 4648    |
| Discharge (cfs)             | S-65E                 | 8482                   | 5255    | 5005   | 7470    | 2873    | 1531    | 1268   | 1471   | 1983    | 2766    | 4507    |
| DO concentration (mg/L)***  | Phase I river channel | 1.19                   | 1.44    | 0.48   | 0.72    | 3.62    | 6.06    | 5.94   | 5.65   | 4.84    | 3.82    | 3.12    |
| Mean depth (feet)*          | Phase I floodplain    | 3.12                   | N/A     | 1.75   | 2.81    | 3.09    | 0.71    | 0.80   | 0.57   | 0.94    | 1.08    | 1.76    |

\* 1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

\*\* Seven-day average of weighted daily means through Sunday midnight.

\*\*\* DO is the average for PC62 and PC33 starting June 2. PC33 omitted for week of Aug16. DO for week of Sept 15-22 is for PC33 only.

\*\*\*\* S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2

\*\*\*\*\* 1-day spatial average from field measurements in Pools A and BC

N/A Not applicable or data not available.

## Water Management Recommendations

### Kissimmee Basin Adaptive Recommendations and Operational Actions

| Date       | Recommendation   | Purpose  | Outcome     | Source       |
|------------|--|--|-------------|--------------|
| 6/14/2016  | No new recommendations.  |  |             |              |
| 6/7/2016   | No new recommendations.  |  |             |              |
| 5/31/2016  | No new recommendations.  |  |             |              |
| 5/24/2016  | No new recommendations.  |  |             |              |
| 5/17/2016  | No new recommendations.  |  |             |              |
| 5/10/2016  | No new recommendations.  |  |             |              |
| 5/3/2016   | No new recommendations.  |  |             |              |
| 4/26/2016  | No new recommendations.  |  |             |              |
| 4/19/2016  | No new recommendations.  |  |             |              |
| 4/12/2016  | No new recommendations.  |  |             |              |
| 4/5/2016   | No new recommendations.  |  |             |              |
| 3/29/2016  | No new recommendations.  |  |             |              |
| 3/22/2016  | No new recommendations.  |  |             |              |
| 3/15/2016  | No new recommendations.  |  |             |              |
| 3/8/2016   | No new recommendations.  |  |             |              |
| 3/1/2016   | No new recommendations.  |  |             |              |
| 2/23/2016  | No new recommendations.  |  |             |              |
| 2/16/2016  | No new recommendations.  |  |             |              |
| 2/9/2016   | No new recommendations.  |  |             |              |
| 2/1/2016   | Begin F&W recessions in East Toho, Toho, and KCH per the requested recession lines shown in the 2015-16 Dry Season Standing Recommendation (SR). Use Table 2 for guidance on rates of change in discharge to control departures from the line in KCH, and the reversal guidelines shown in the SR for Toho and East.   | Initiate and manage lake stage recessions in East Toho, Toho, and KCH for the benefit of fish and wildlife, while avoiding harm to the Kissimmee River | TBD         | KB Tech Team |
| 1/20/2016  | Continue to adjust discharge at S65 to follow the 2015-16 Dry Season SR guidelines for rampdown at S65A. Balance discharge at the two structures to maintain at least minimum discharge to the river. As stage rises above 51 ft in KCH, temporarily bypass the Fig 1 discharge plan in the SR and manage discharge to let KCH stage rise to 51.5 ft (the Feb 1 recession starting stage) if conditions allow while following rampdown guidelines. If KCH stage rises further than 51.5 ft, we will reevaluate. As changes in discharge become necessary, continue to follow the Table 1 guidelines in the SR. Switch to Table 2 rampup/rampdown guidelines on Feb 1 or when the recession line is intercepted for management of the recession in KCH. | If conditions allow, let stage increase to 51.5 ft to intersect the Feb 1 starting stage for KCH F&W recession line.                                   | Implemented | KB Tech Team |
| 12/10/2015 | Temporarily raise from 50.5 ft to 51 ft the threshold stage for increasing discharge at S65/S65A to 1400 cfs. This is a temporary modification of the current draft 2015-16 dry season Standing Recommendation (SR). Discontinue last week's temporary change in the rate of discharge increase and return to the original per-day rates shown in Table 1 of the draft SR - i.e., increase discharge to 1400 cfs at a rate of 150 cfs/day rather than 150 cfs/2 days. If KCH stage should start to decline while ramping up but before reaching 1400 cfs, begin to ramp back down using the rates in Table 1.  | Slow the effect of discharge on KCH stage, balance KCH stage and KRRP discharge objectives.  | Implemented | KB Tech Team |

## KCOL Hydrographs (through Sunday midnight)

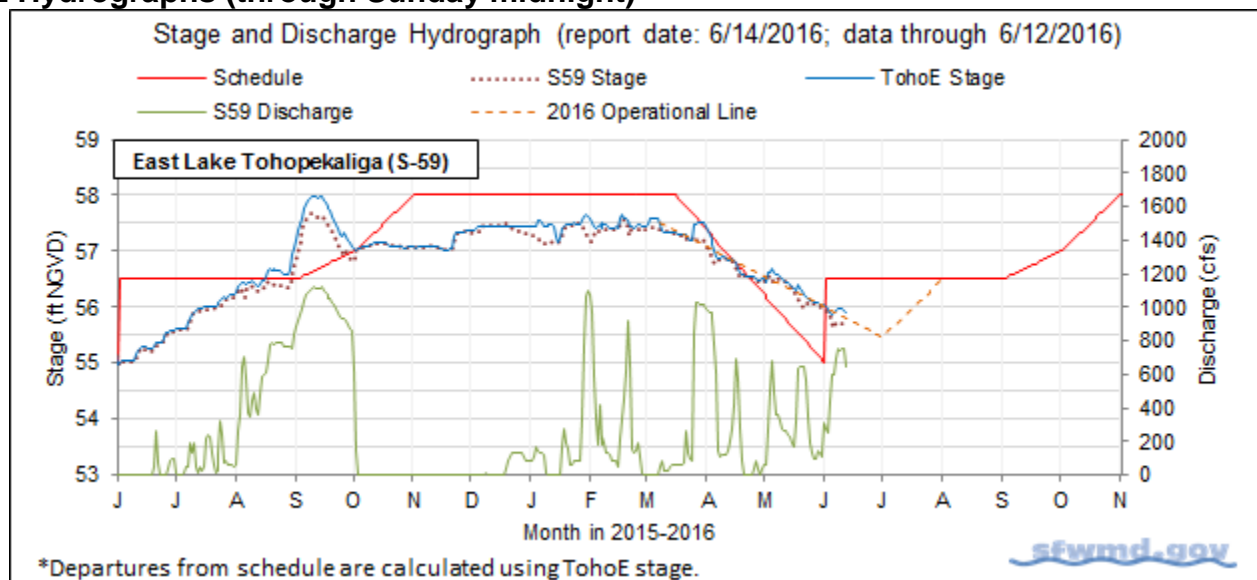


Figure 1.

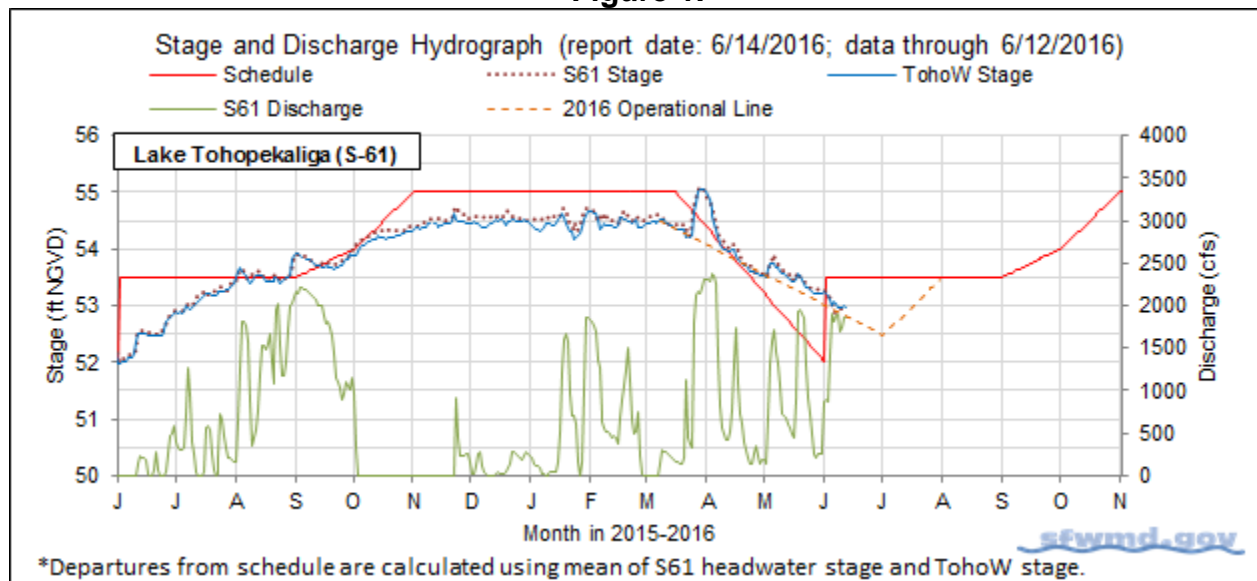


Figure 2.

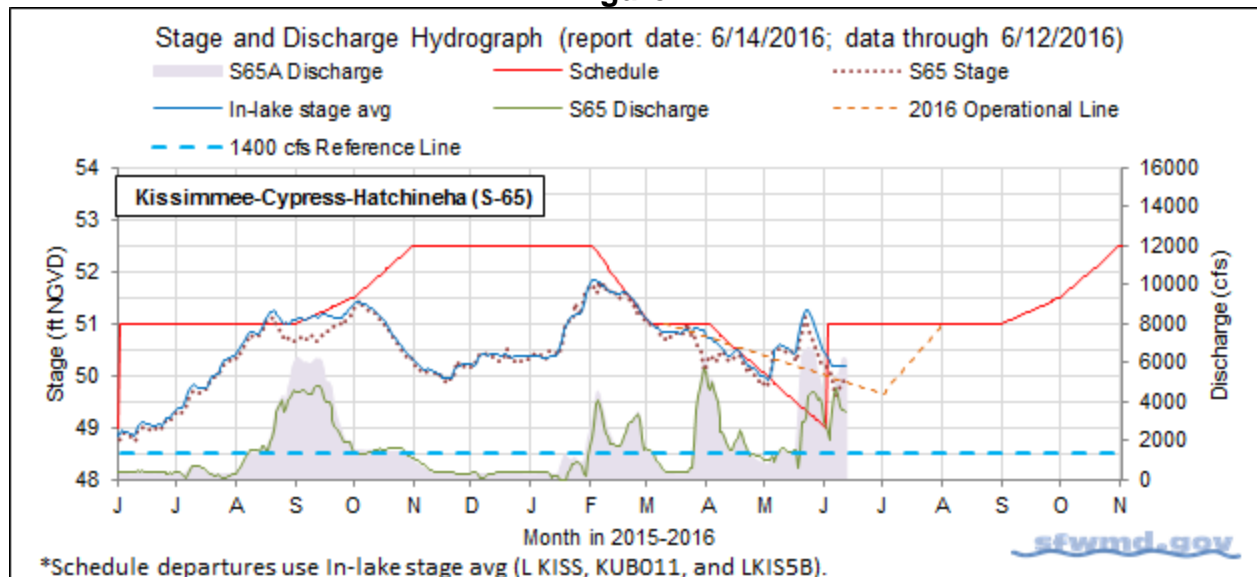


Figure 3.

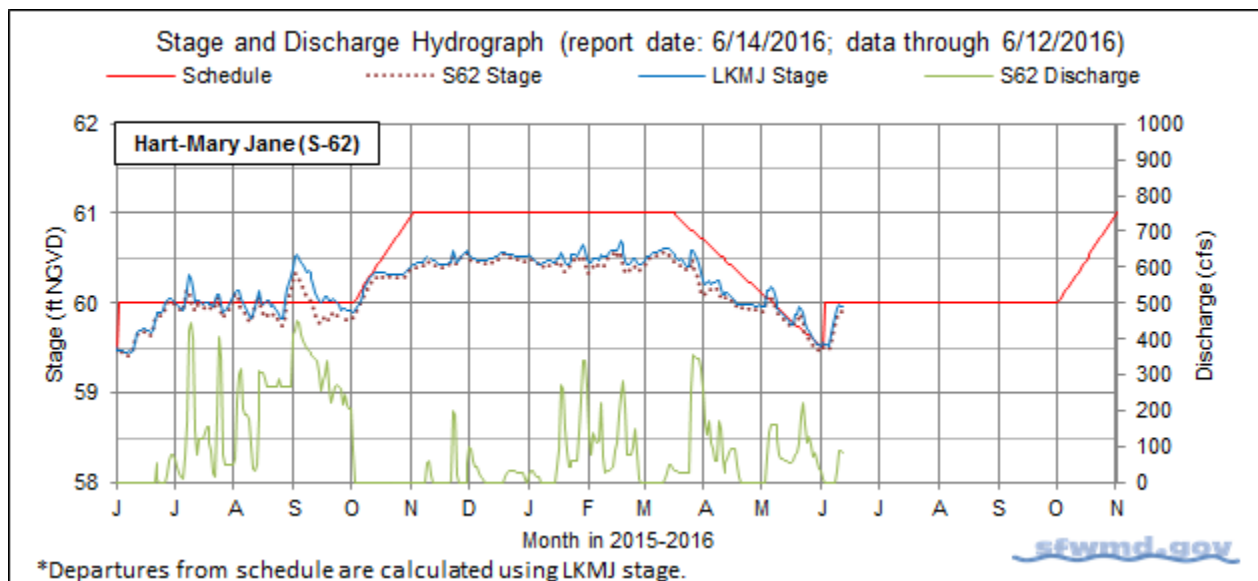


Figure 4.

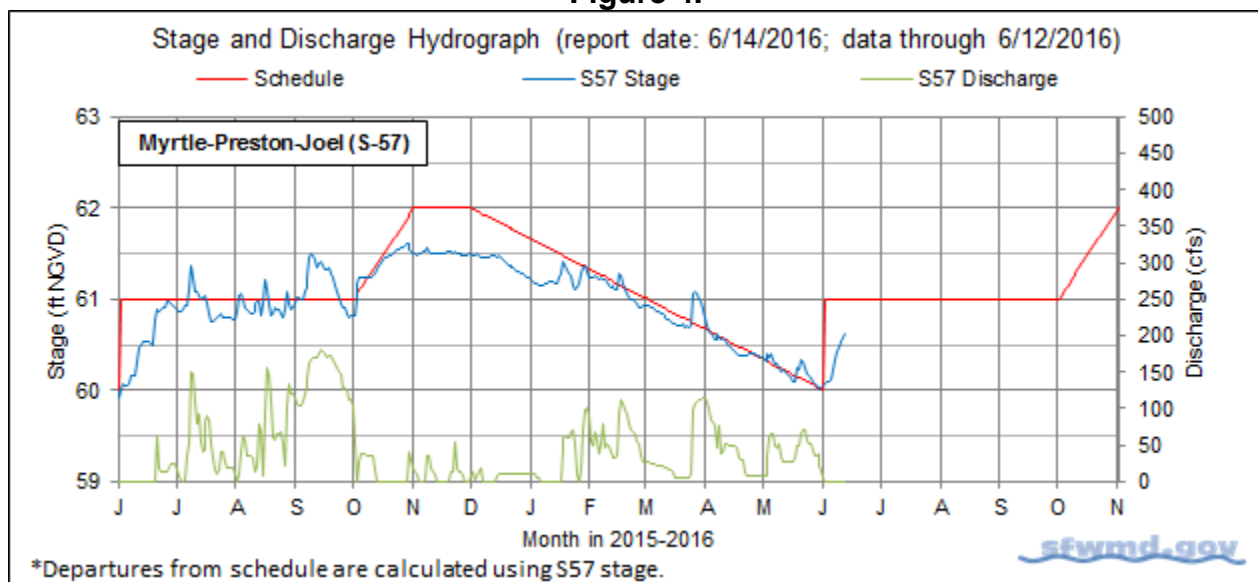


Figure 5.

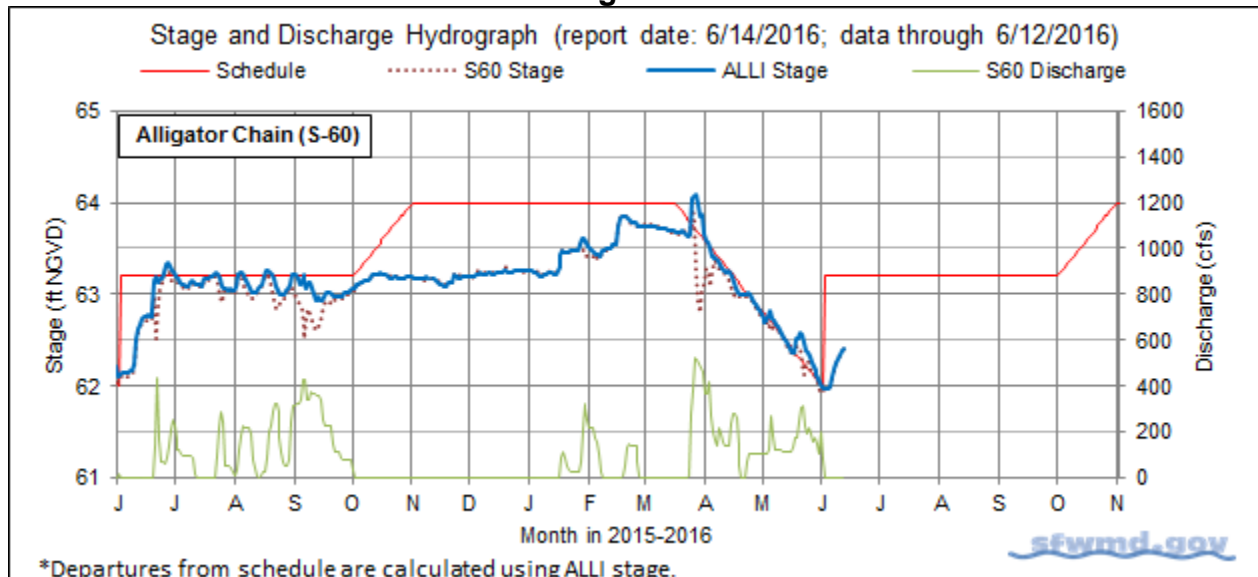


Figure 6.



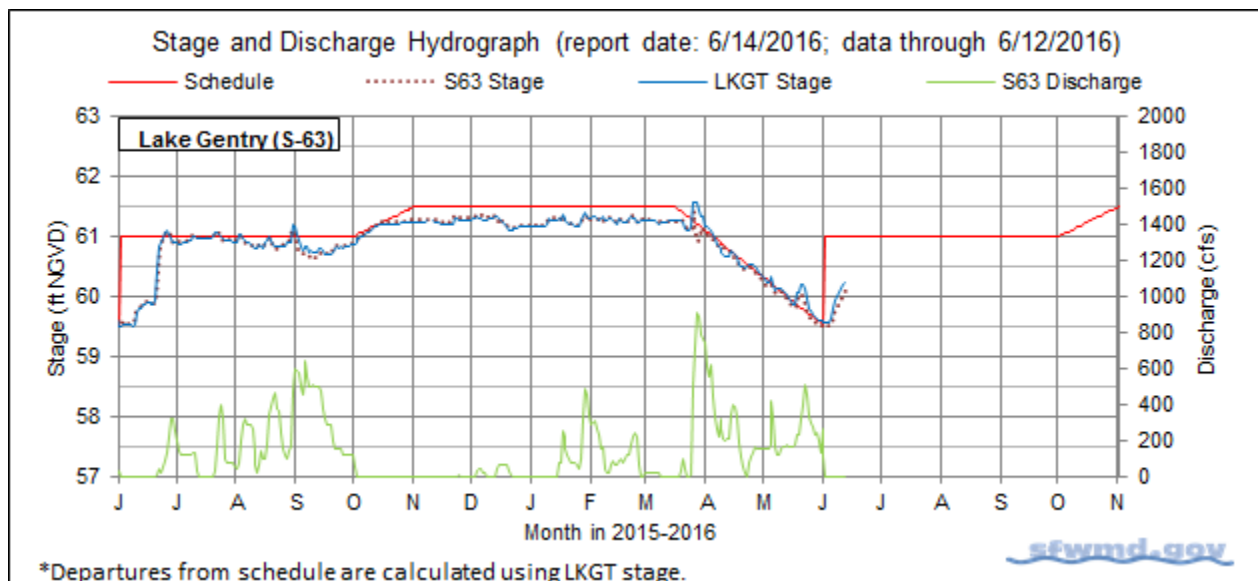
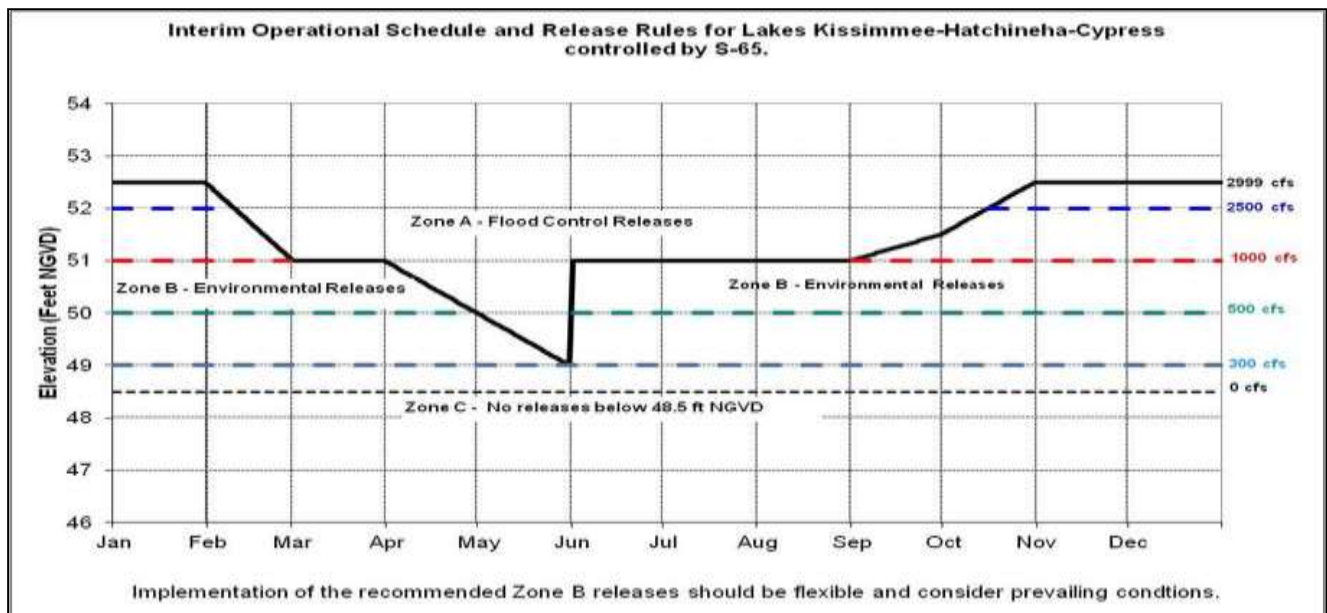


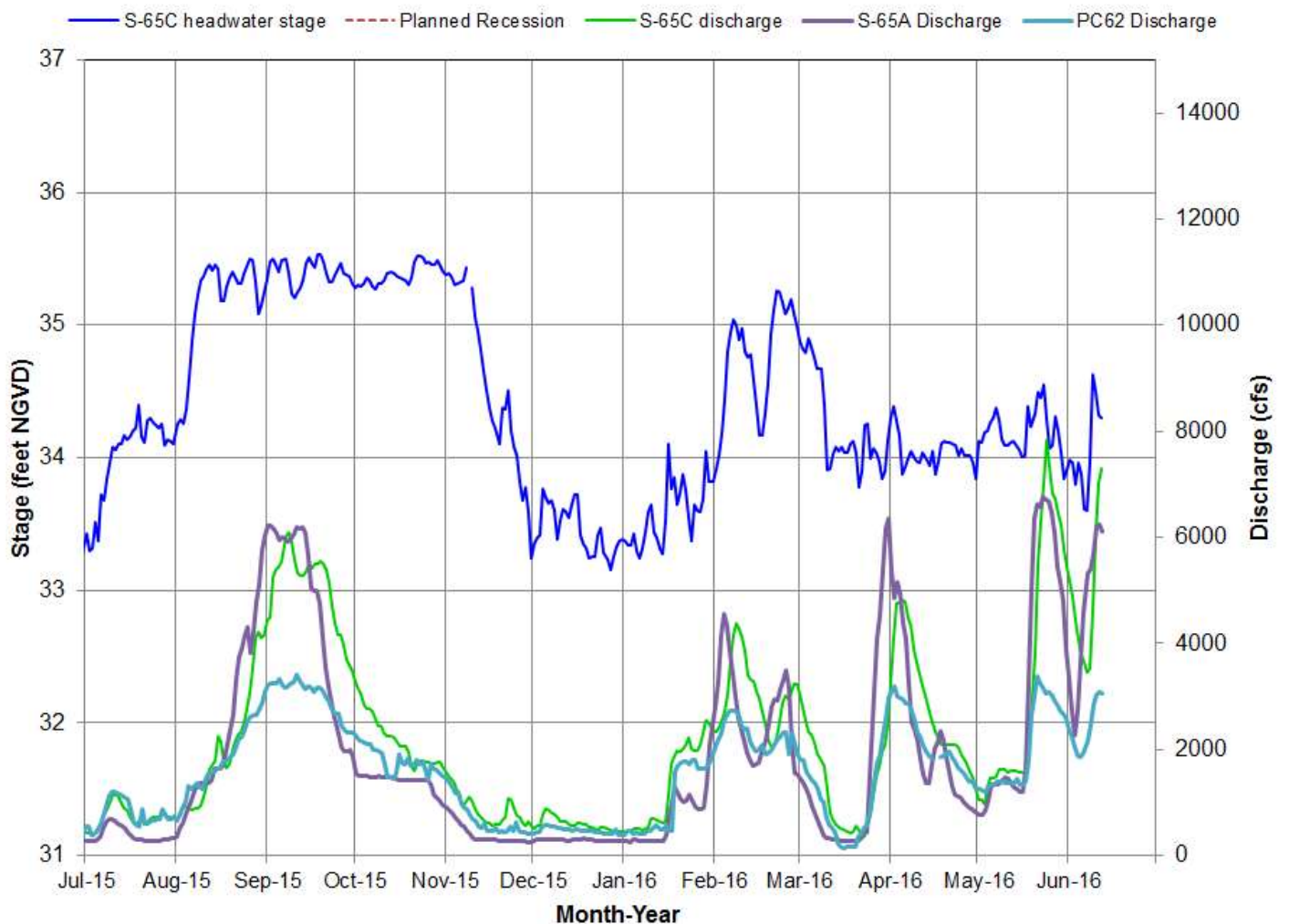
Figure 7.

| Table 1. Discharge Rate of Change Limits for S65/S65A<br>(Rate limits apply only in Zone B)  |           |   |   |
|--|-----------|---|---|
|  | Q (cfs)   | Maximum<br>rate of<br>increase<br>(cfs/day) | Maximum<br>rate of<br>decrease<br>(cfs/day) |
| Zone B   | 0-300     | 50  | -50   |
|  | 300-1400  | 150*  | -75   |
|  | 1400-2500 | 300   | -300  |
|  | 2500-3000 | 1000  | -1000                                       |
| Zone A   | No limits |   |   |
| <b>*DRY FLOODPLAIN RULE.</b> When the Kissimmee River floodplain is dry (>7 days at 300 cfs), increases above 1200 cfs should be made in consultation with LRE Operations (Steve Bousquin and David Anderson). |           |   |   |

Figure 8a. Limits on rate of discharge change at S65/S65A from the 2015-2016 Dry Season Standing Recommendation.

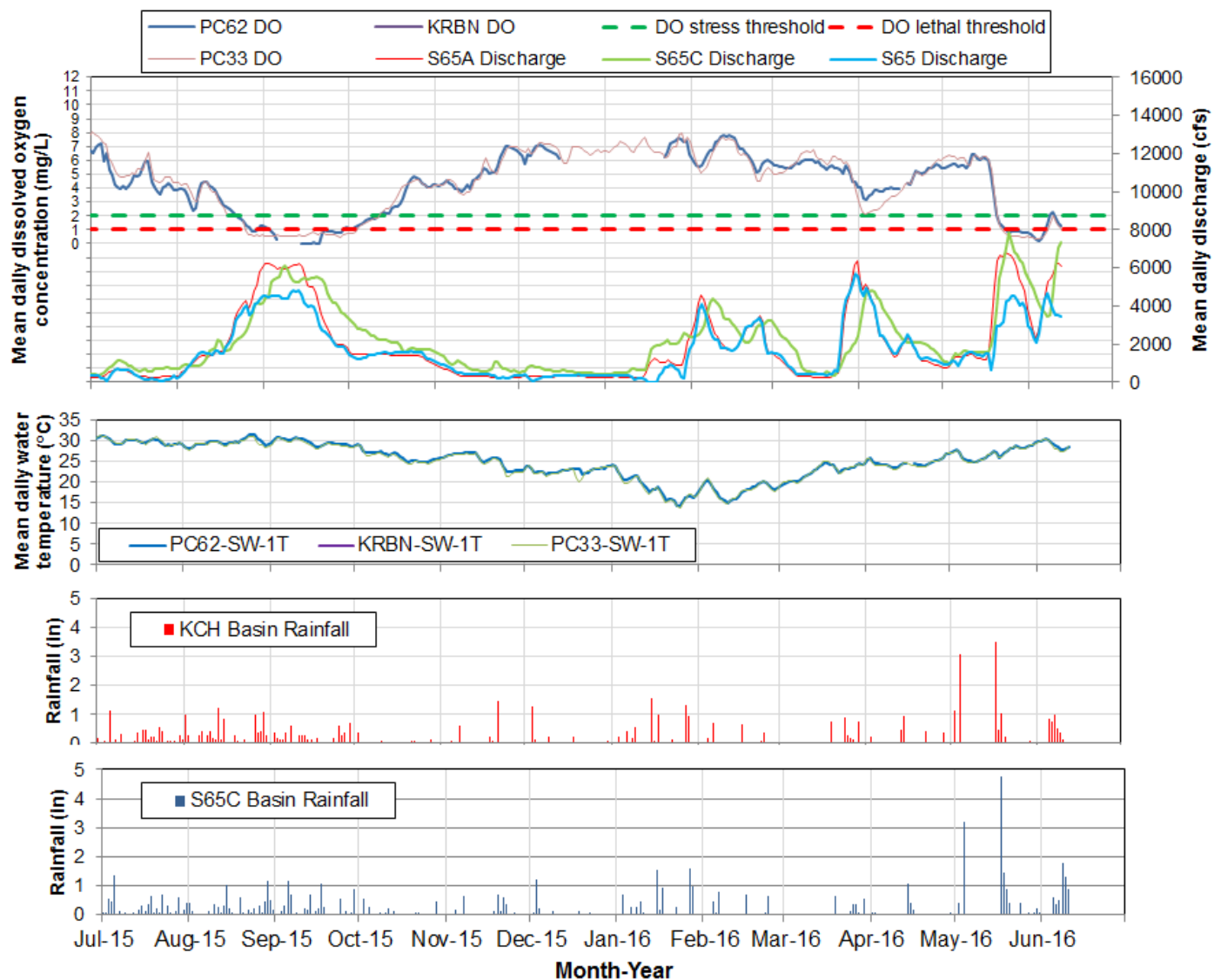


**Figure 8b.** Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years or in Wet Season 2015.

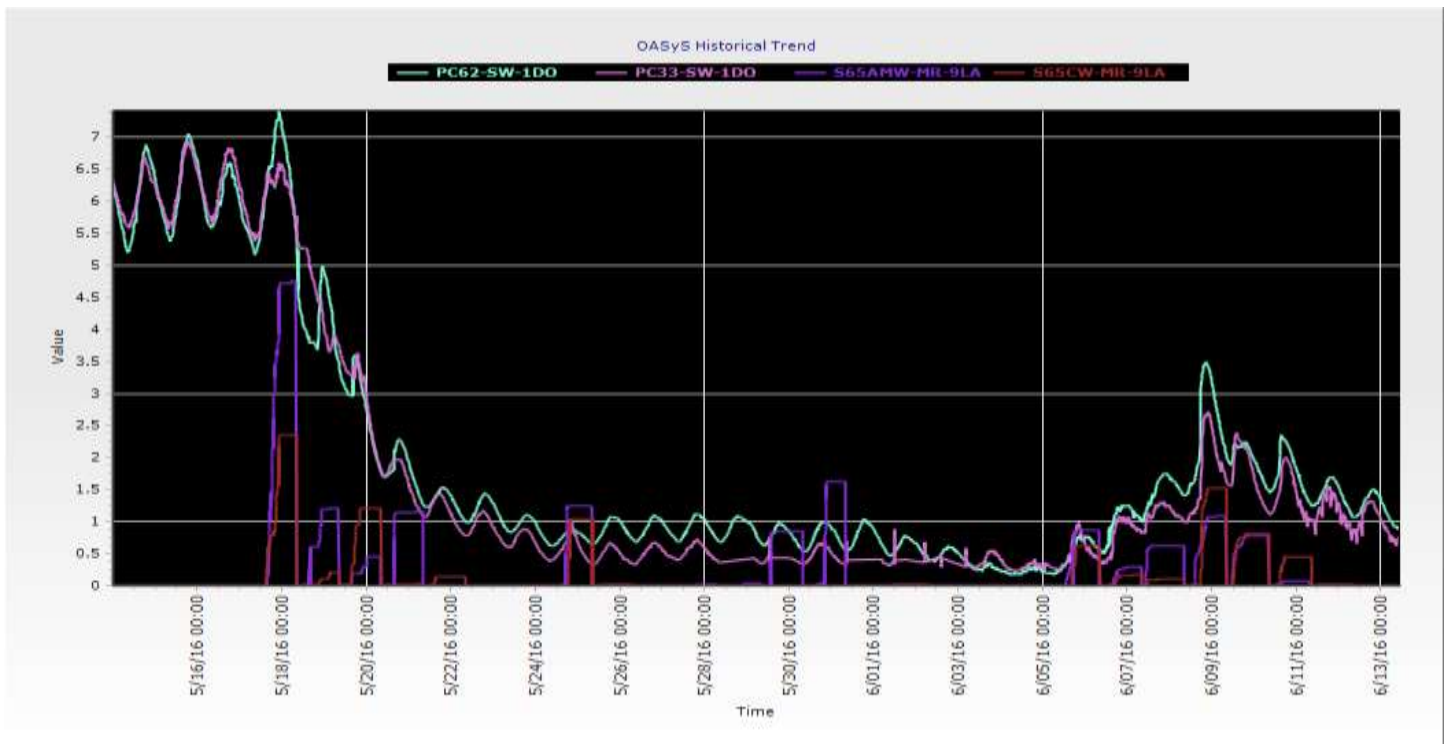


**Figure 9.** S-65C headwater stage in relation to discharge at S-65C, S-65A, and PC62.

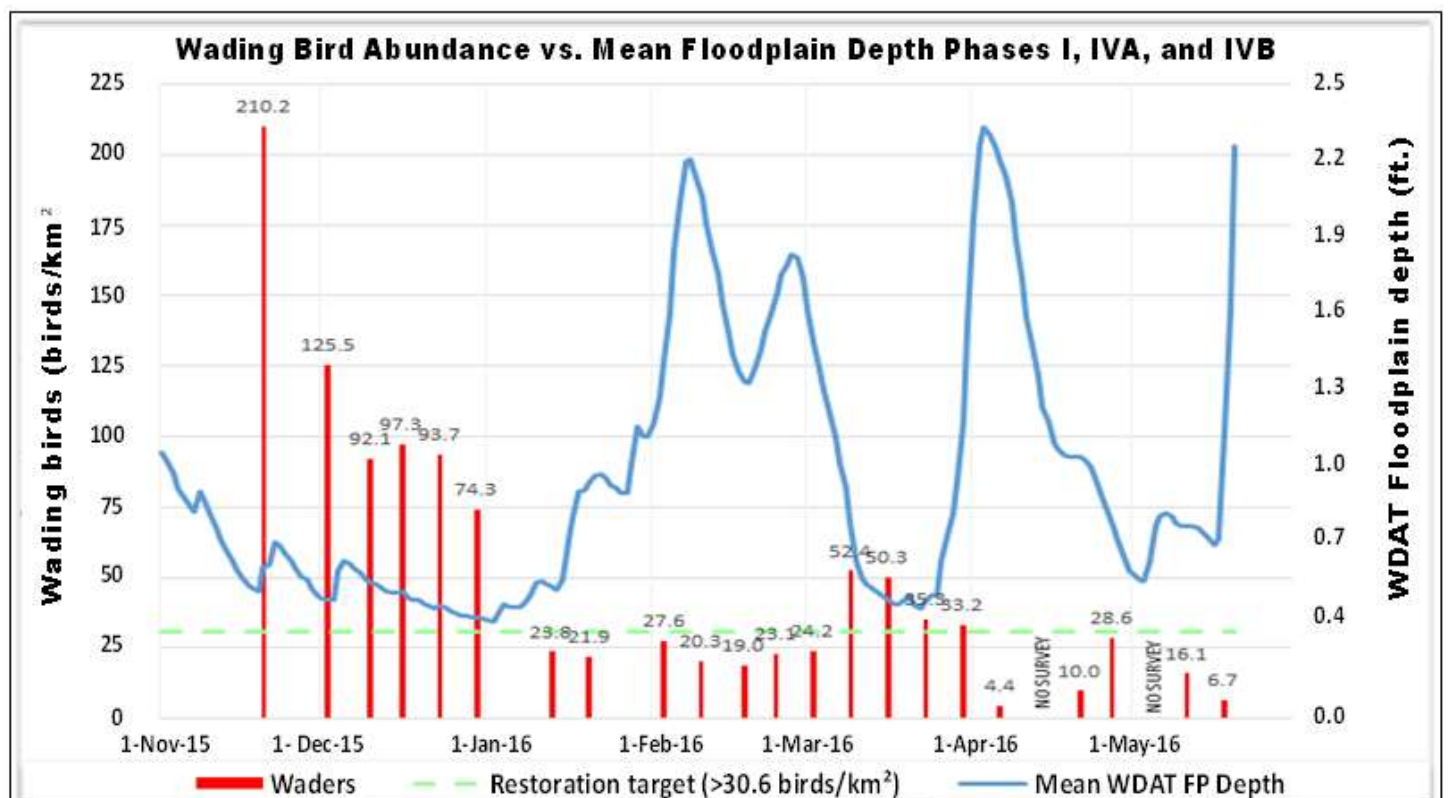




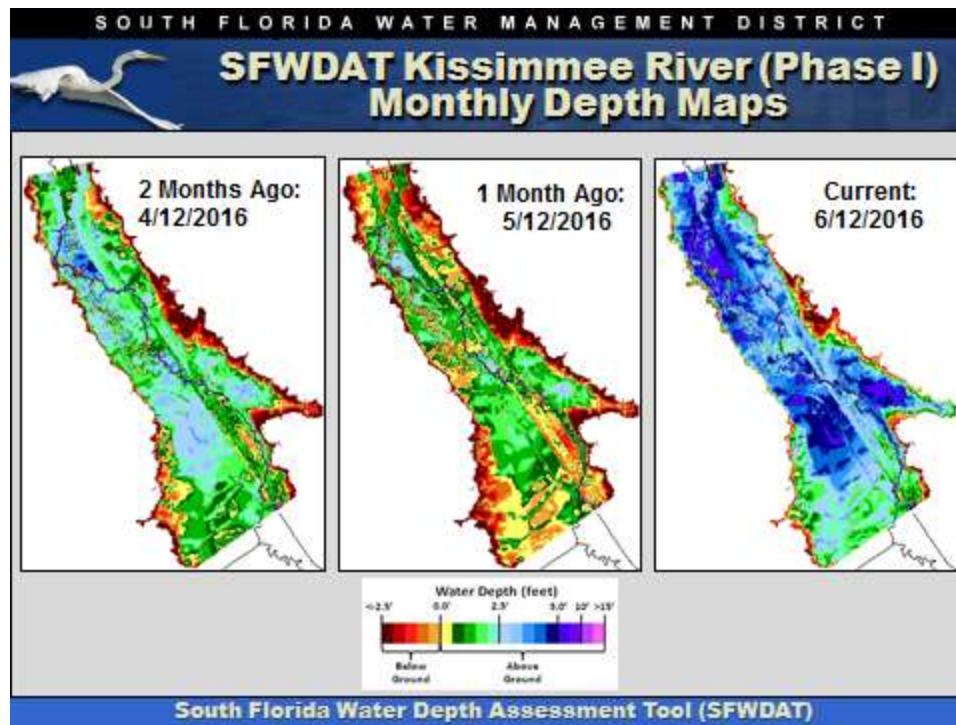
**Figure 10.** Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.



**Figure 11.** Phase I river channel dissolved oxygen (measured at 15 minute intervals) and rainfall at S65A and S65C.

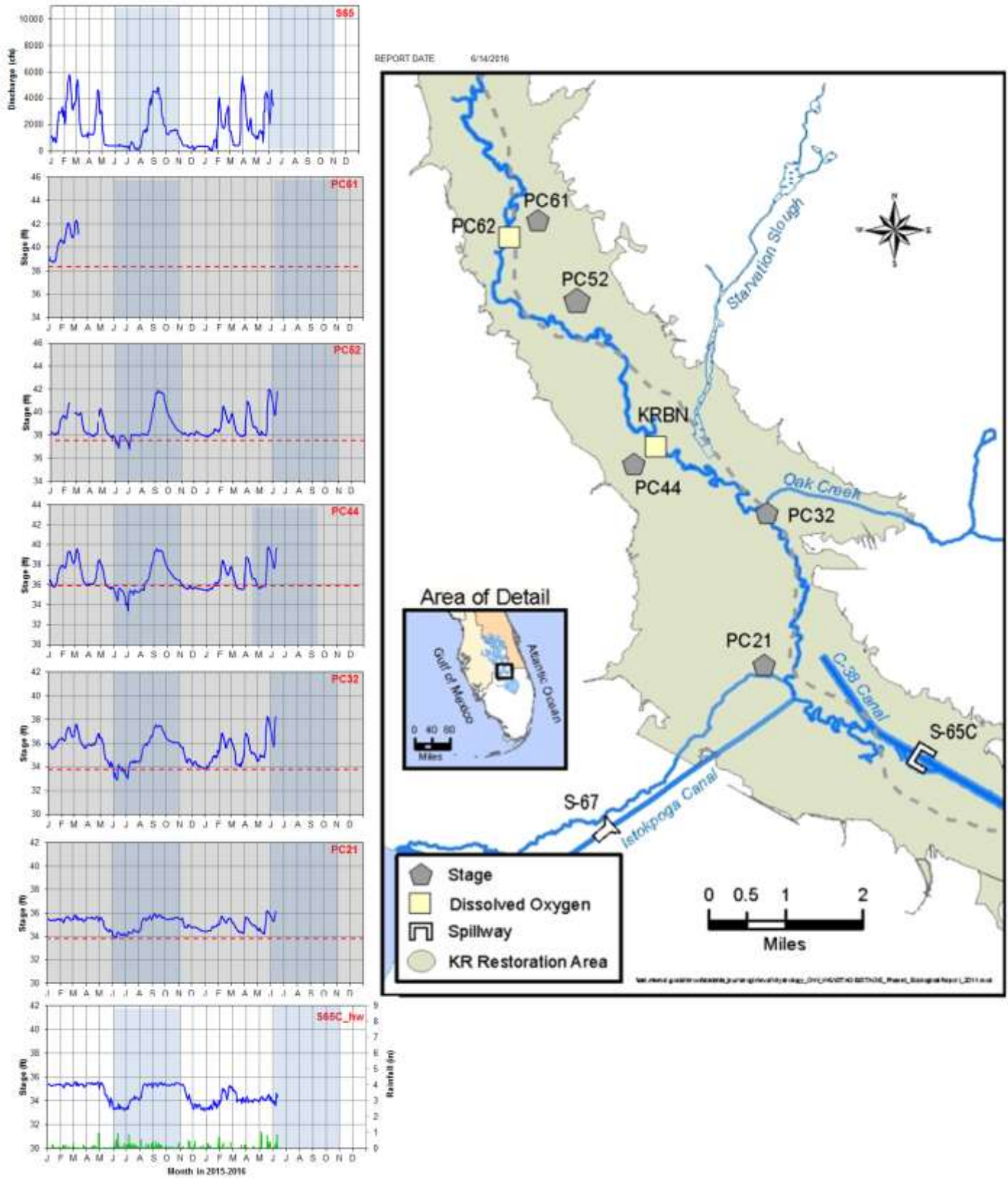


**Insert 1.** Wading bird abundance on the Kissimmee River floodplain in 2015-2016 dry season. Stage reversals (increases in water depth) are caused by increases in flow at S65/S65A following rainfall. Stage reversals affect the ability of wading birds to use floodplain habitats because they cannot forage in water that is too deep.



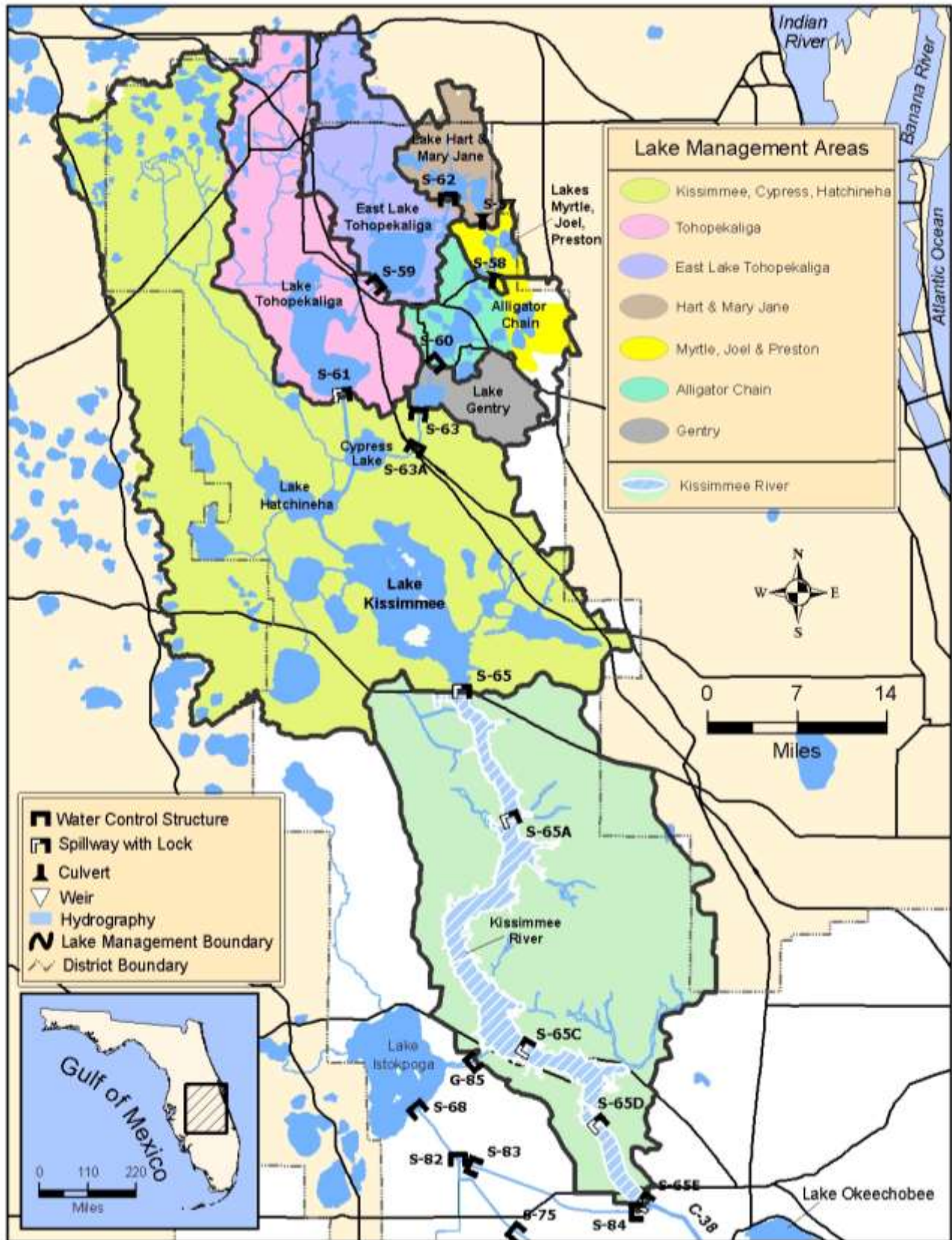
**Figure 12.** Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.

## Kissimmee River Hydrographs



**Figure 13.** Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2015. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated). Dashed lines are ground elevations.





**Figure 14.** The Kissimmee Basin



## **LAKE OKEECHOBEE**

According to the USACE web site, Lake Okeechobee stage is at 14.73 feet NGVD for the period ending at midnight on June 14, 2016. This value is based on the use of four interior Lake stations (L001, L005, L006, and LZ40) and four perimeter stations (S352, S4, S308 and S133). Lake stage increased by 0.33 feet over the past week and is 1.01 feet higher than it was a month ago and 2.11 feet higher than it was a year ago (Figure 1). The Lake is in the Low Flow Sub-band (Figure 2). According to RAINДАР, 2.52 inches of rain fell directly over the Lake during the past seven days. The surrounding watershed experienced generally higher rainfall amounts except for the upper Kissimmee Valley where lower amounts prevailed.

Based on USACE reported values, current Lake inflow is approximately 17,657 cfs, nearly three times higher than on this date last week. Flows are listed below.

| <b>Structure</b>                       | <b>Flow cfs</b> |
|--|-----------------|
| S65E                                   | 8772            |
| S154                                   | 25              |
| S84 & 84X                              | 3434            |
| S71                                    | 1494            |
| S72                                    | 522             |
| C5(Nicodemus slough dispersed storage) | -83             |
| S191                                   | 334             |
| S133 PUMPS                             | 73              |
| S127 PUMPS                             | 71              |
| S129 PUMPS                             | 80              |
| S131 PUMPS                             | 32              |
| S135 PUMPS                             | 205             |
| Fisheating Creek                       | 2679            |
| S2 Pumps                               | 0               |
| S3 Pumps                               | 0               |
| S4 Pumps                               | 0               |

Current Lake outflow is approximately 5,335 cfs exiting at S77 (3,968 cfs), S308 (1,110 cfs) and to the L8 canal through Culvert C10A (257 cfs). Water supply demands remain low in the EAA contributing to less water moving south. Corrected evapotranspiration value based on the L006 weather platform solar radiation data for this past week was 2,700 cfs.

Change in elevation equivalents and average weekly flows for major structures are presented in Figure 4. Weekly average values for S77 and S308 are based on USGS data for the below structure gauges.

Florida Atlantic University avian scientists report that the wading bird nesting season on Lake Okeechobee is drawing to a close with most chicks now in the fledgling stage. The last wading bird foraging flight of the season was conducted on June 9. The flight identified only 366 birds in two flocks foraging on the Lake (Figure 5).

The Florida Fish and Wildlife Conservation Commission (FFWCC) reports that snail kite survey number five located four new nests on the Lake bringing the total this year to 89 nests. Twenty-three of these nests have thus far been declared successful (Figure 6).

The most recent MODIS satellite images for June 4 and 12 appear to indicate the potential for algal bloom development across a large portion of the central pelagic zone (Figure 7). Observations made by Lake Okeechobee staff during the June 9 wading bird flight support the accuracy of this imagery as do observations by Water Quality staff made today. Florida Department of Environmental Protection also reported a low level microcystin concentration (1.61 ppb) on June 2 in the vicinity of Port Mayaca.

### Water Management Recommendations

The winter/spring dry season has ended and despite continued high release rates through S77 and S308, Lake stage rose 0.33 feet over the past week. It is unclear whether any additional short-term recession of Lake stage is to be anticipated unless it results from USACE management actions or unusually dry climatic conditions. The current Lake stage is too high and the ascension rate is too rapid for this time of year and not beneficial to breeding snail kites. It may also result in an increased loss of submerged aquatic vegetation, inundation of apple snail eggs, and an increased risk of cyanobacterial blooms. Future short-term recommendations are highly dependent on the near-term rainfall patterns and amounts. The goal should be to limit the rate of Lake stage increase or initiate an unseasonable recession in Lake stage to avoid exceeding the top of the preferred stage envelope (15.5 feet NGVD) during the wet season.

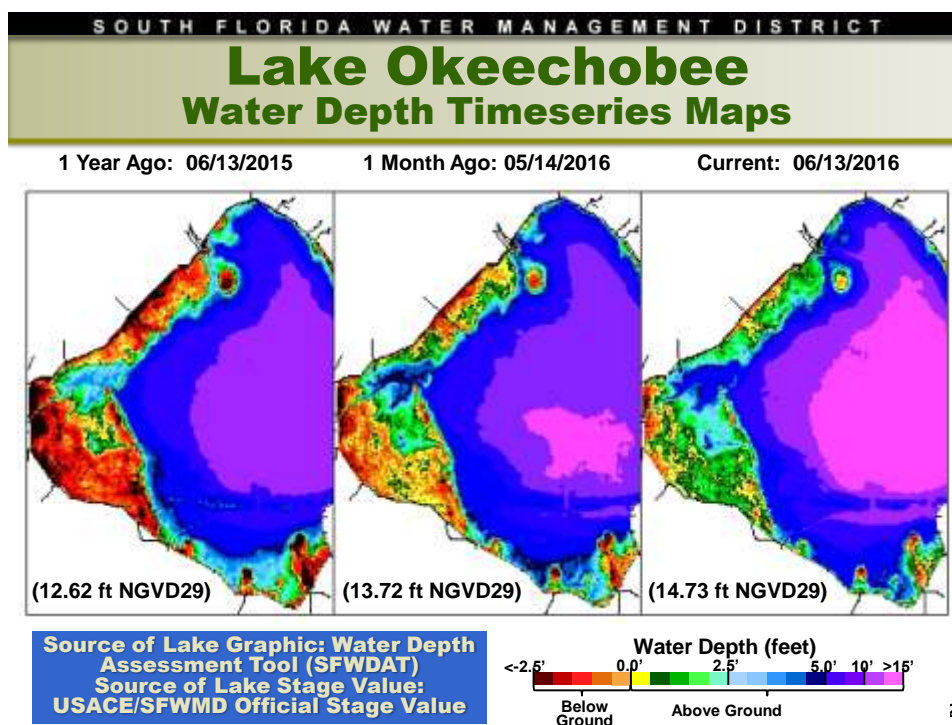


Figure 1

## Lake Okeechobee Water Level History and Projected Stages

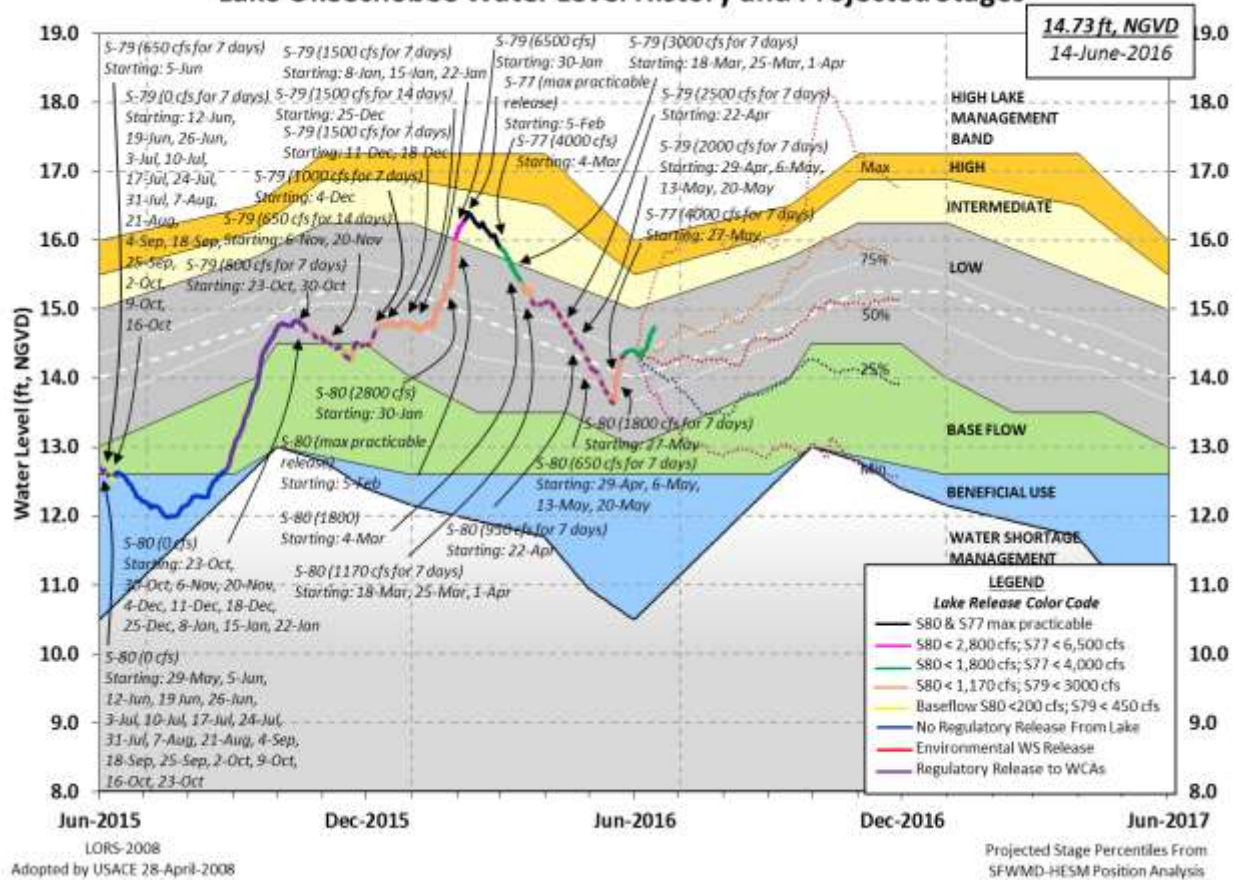


Figure 2

# SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

FROM: 0215 EST, 06/07/2016 THROUGH: 0215 EST, 06/14/2016

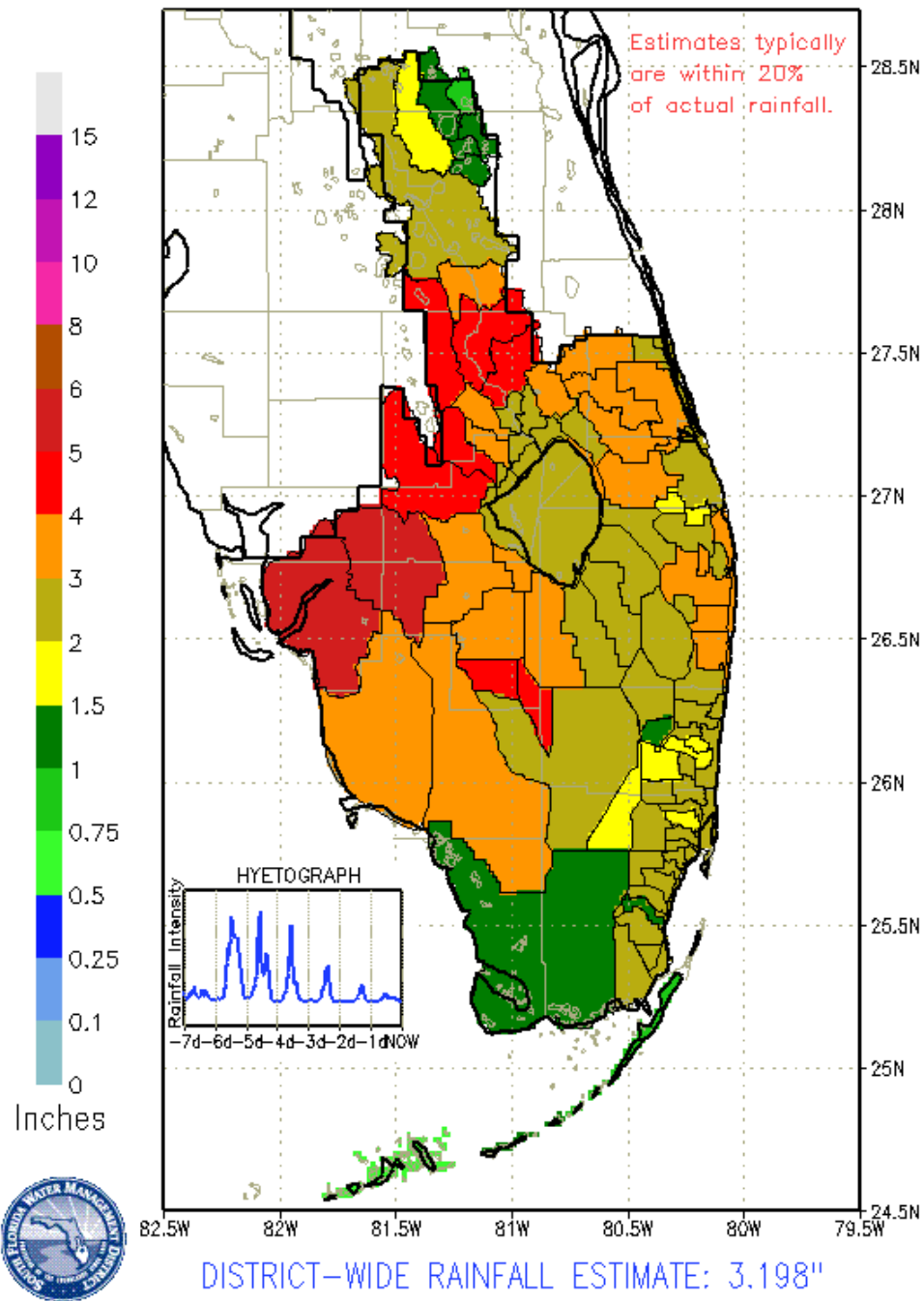


Figure 3

| INFLOWS          | Average Daily Flow Past Week<br>cfs | Feet of Change Past Week |
|------------------|-------------------------------------|--------------------------|
| S65E             | 5469                                | 0.182                    |
| S71 & 72         | 1569                                | 0.052                    |
| S84 & 84X        | 1917                                | 0.064                    |
| Fisheating Creek | 629                                 | 0.021                    |
| Rainfall         | N.A.                                | 0.210                    |
| OUTFLOWS         | Average Daily Flow Past Week<br>cfs | Feet of Change Past Week |
| S77              | 3390                                | 0.113                    |
| S308             | 1160                                | 0.039                    |
| S351             | 0                                   | 0.000                    |
| S352             | 236                                 | 0.008                    |
| S354             | 0                                   | 0.000                    |
| L8               | 324                                 | 0.011                    |
| ET               | 2700                                | 0.090                    |

Figure 4



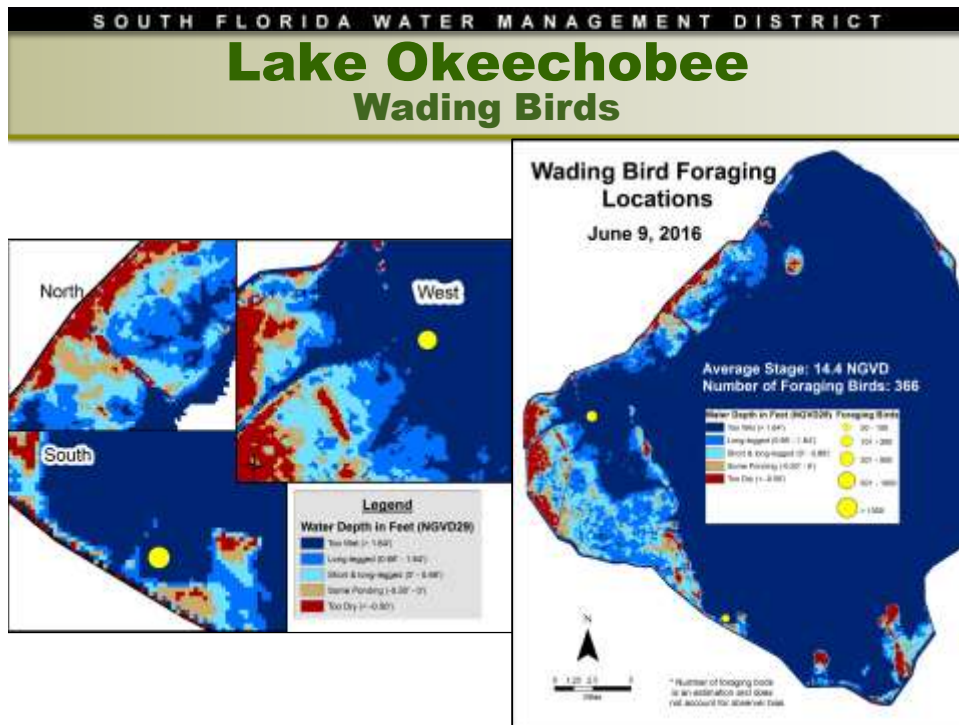


Figure 5

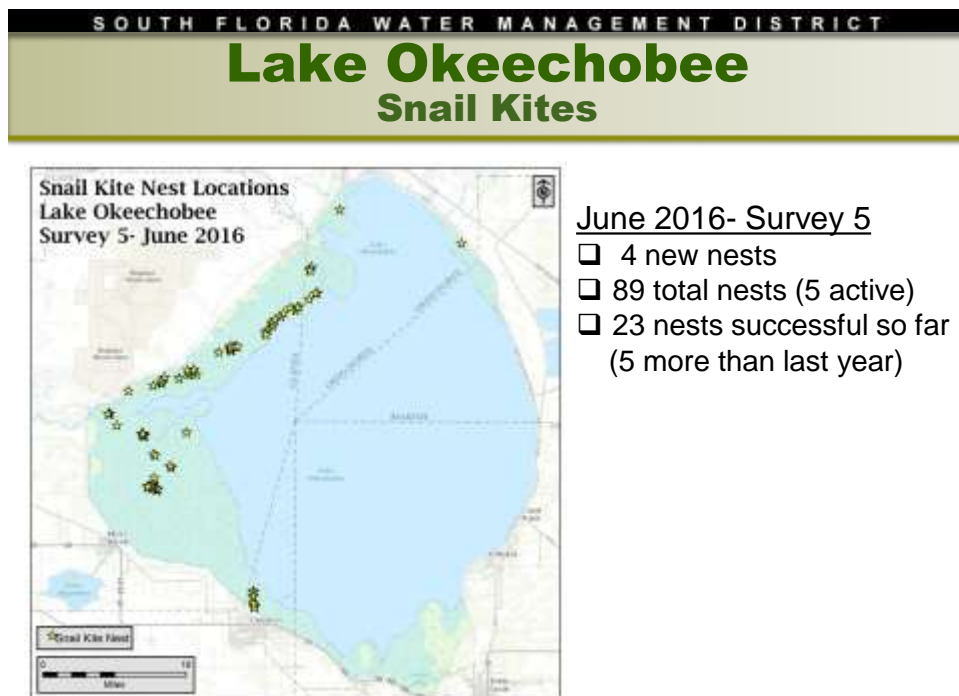


Figure 6

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

# Lake Okeechobee

## Algal Blooms

### Unvalidated and Experimental Data

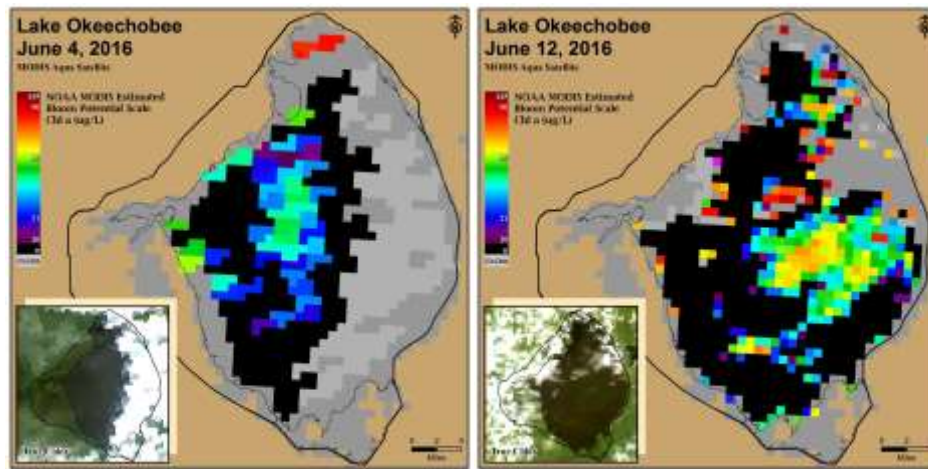


Figure 7

### Lake Istokpoga

The Lake Istokpoga regulation schedule has returned to its annual low pool stage of 38.25 feet NGVD. Lake stage is 38.3 feet NGVD and is currently 0.18 feet above regulation (Figure 8). Average flows into the Lake from Arbuckle and Josephine creeks were 1,457 and 376 cfs respectively, an approximately three-fold increase from the preceding week. Average discharge from S68 and S68X this past week was 2,506 cfs, also an approximately three-fold increase compared to the preceding week. According to RAINДАР, 4.28 inches of rain fell in the Lake Istokpoga watershed during the past seven days.

The FFWCC reports that snail kite survey five identified four new nests bringing the total for Lake Istokpoga this year to 68 total nests, of which 15 have been deemed successful to date (Figure 9).

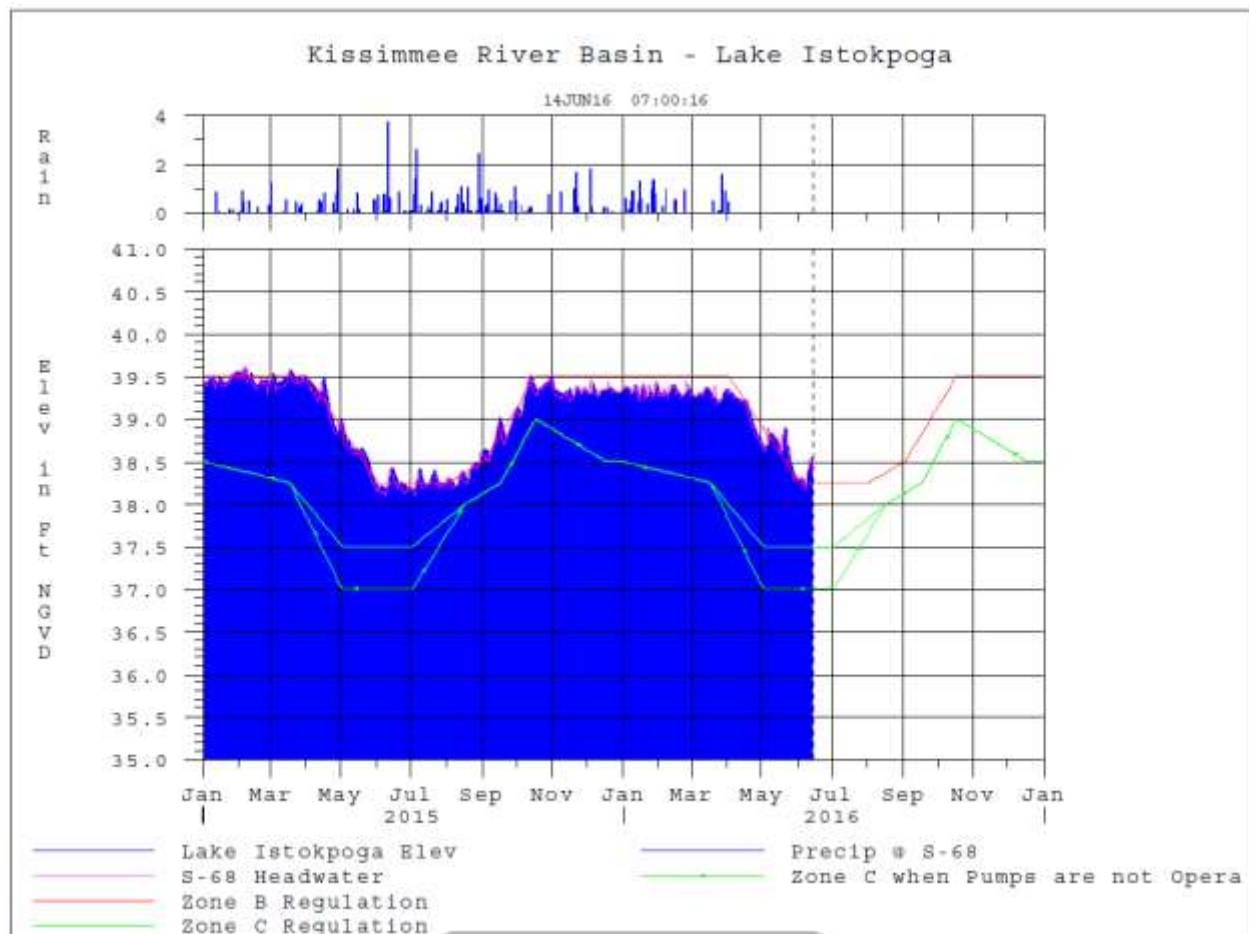


Figure 8

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

## Lake Istokpoga Snail Kites



### June 2016- Survey 5

- ☐ 3 new nests
- ☐ 68 total nests
- ☐ 3 newly successful nests
- ☐ 15 nests successful so far  
(beats last year's record)

Figure 9

## **ESTUARIES**

### **St. Lucie Estuary**

Over the past week, provisional flows averaged about 1,845 cfs at S-80, 1,160 cfs downstream of S-308, 904 cfs at S-49 on C-24, 614 cfs at S-97 on C-23, and 167 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 1,108 cfs (Figures 1 and 2). Total inflow averaged about 4,638 cfs last week and 3,399 cfs over last month.

Over the past week, salinity decreased throughout the estuary (Table 1, Figures 3 and 4). The seven-day moving average salinity of the water column at the US1 Bridge is about 2.3. Salinity conditions in the middle estuary are in the poor range for the adult eastern oyster and have been for 25 consecutive days.

Table 1. Seven-day average salinity at three monitoring stations in the St. Lucie Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary.

| Sampling Site | Surface           | Bottom             | Envelope        |
|---------------|-------------------|--------------------|-----------------|
| HR1 (N. Fork) | <b>0.5</b> (1.0)  | <b>1.1</b> (1.8)   | NA <sup>1</sup> |
| US1 Bridge    | <b>1.7</b> (3.1)  | <b>2.8</b> (4.7)   | 10.0-26.0       |
| A1A Bridge    | <b>7.0</b> (11.7) | <b>16.0</b> (19.2) | NA              |

<sup>1</sup>Envelope not applicable

### **Caloosahatchee Estuary**

During the past week, provisional flows averaged approximately 3,390 cfs downstream of S-77, 4,597 cfs at S-78, and 9,083 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 2,414 cfs (Figures 5 and 6). Total inflow averaged 11,497 cfs last week and 5,975 cfs over last month.

Over the past week, surface salinity decreased throughout the estuary (Table 2, Figures 7 and 8). The seven-day average salinity values are within the good range for adult oysters at Shell Point and at Sanibel and has been in the poor range at Cape Coral for 21 consecutive days (Figure 9). The 30-day moving average surface salinity is 0.2 at Val I-75 and 0.4 at Ft. Myers. Salinity conditions at Val I-75 are in the good range for tape grass.

Table 2. Seven-day average salinity at six monitoring stations in the Caloosahatchee Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for tape grass (*Vallisneria americana*) at Val I-75 and for adult eastern oysters (*Crassostrea virginica*) elsewhere.

| Sampling Site         | Surface            | Bottom             | Envelope             |
|-----------------------|--------------------|--------------------|----------------------|
| S-79 (Franklin Lock)  | <b>0.2</b> (0.2)   | <b>0.2</b> (0.2)   | NA <sup>1</sup>      |
| *Val I75              | <b>0.2</b> *(0.2*) | <b>0.2</b> *(0.2*) | 0.0-5.0 <sup>2</sup> |
| Ft. Myers Yacht Basin | <b>0.2</b> (0.2)   | <b>0.2</b> (0.3)   | NA                   |
| Cape Coral            | <b>1.0</b> (3.0)   | <b>1.1</b> (4.1)   | 10.0-30.0            |
| Shell Point           | <b>7.8</b> (16.1)  | <b>14.2</b> (20.6) | 10.0-30.0            |
| Sanibel               | <b>24.5</b> (26.7) | <b>28.5</b> (28.3) | 10.0-30.0            |

<sup>1</sup>Envelope not applicable, <sup>2</sup>Envelope is based on a 30-day average.

\*Val I75 is temporarily offline due to bridge construction,

Salinity values are estimated using models developed for this site.

Monitoring data collected by the River, Estuary and Coastal Observing Network of Sanibel-Captiva Conservation Foundation using continuous sensors are summarized in Table 3 as concentration ranges of Chlorophyll *a* and dissolved oxygen at Beautiful Island, Ft. Myers, and Shell Point in the Caloosahatchee Estuary.

Table 3. Weekly ranges of Chlorophyll *a* (a measure of algal biomass) and dissolved oxygen concentrations at three monitoring stations maintained by the Sanibel-Captiva Conservation Foundation.

|                             | RECON Monitoring Stations |           |                                   |
|-----------------------------|---------------------------|-----------|-----------------------------------|
|                             | Beautiful Island          | Ft. Myers | Shell Point                       |
| Chlorophyll <i>a</i> (µg/l) | 4.8 – 6.6                 | 2.5 – 5.5 | 2.8 – 7.6<br>Spike to 31 (6/7/16) |
| Dissolved Oxygen (mg/l)     | 3.0 – 5.3                 | 3.7 – 6.7 | 3.0 – 6.3                         |

The Florida Fish and Wildlife Research Institute reported on June 10, 2016, that *Karenia brevis*, the Florida red tide organism, was not present in samples collected from Lee County.

### Water Management Recommendations

Given the current estuarine conditions, there are no ecological benefits associated with additional releases from Lake Okeechobee.

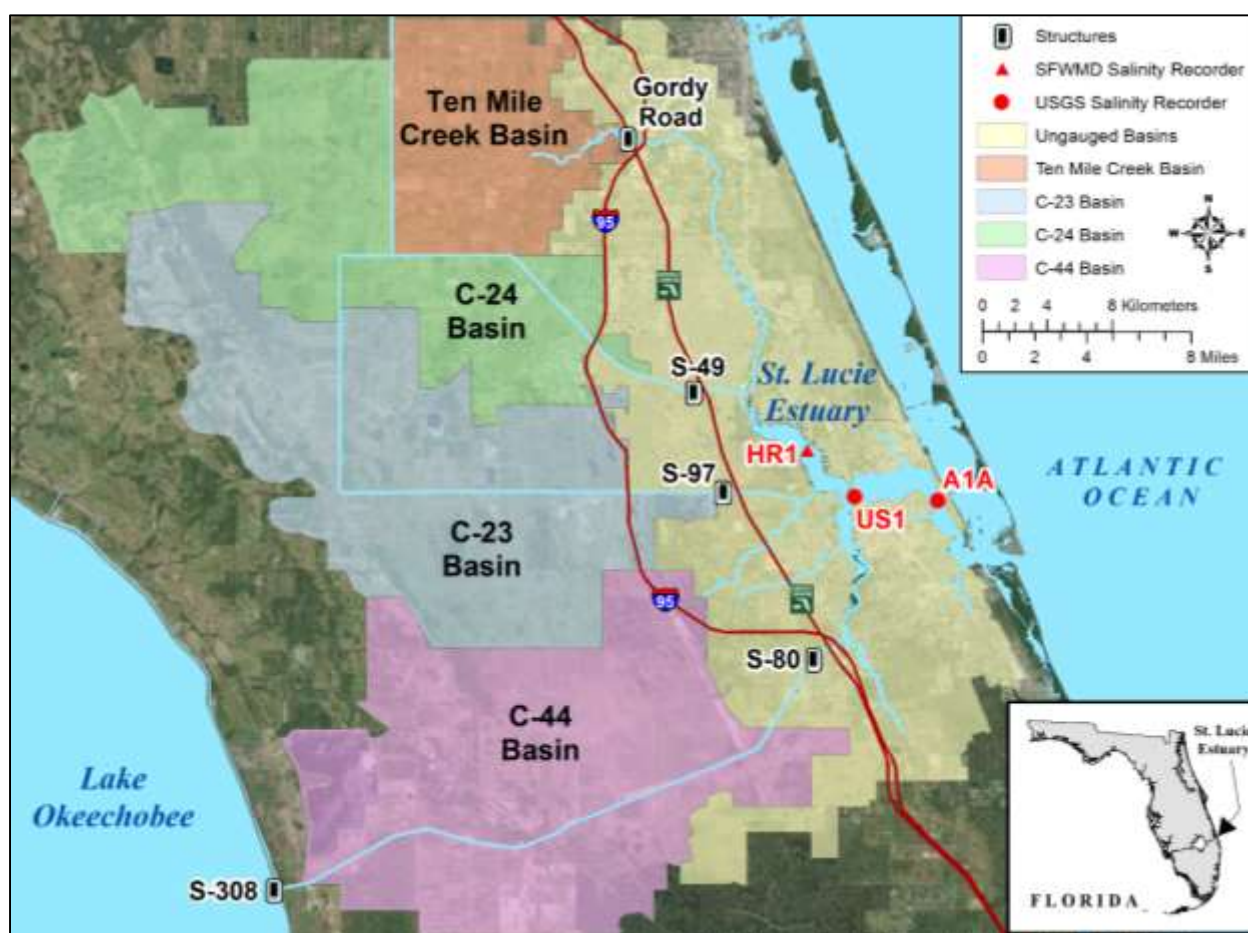


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.



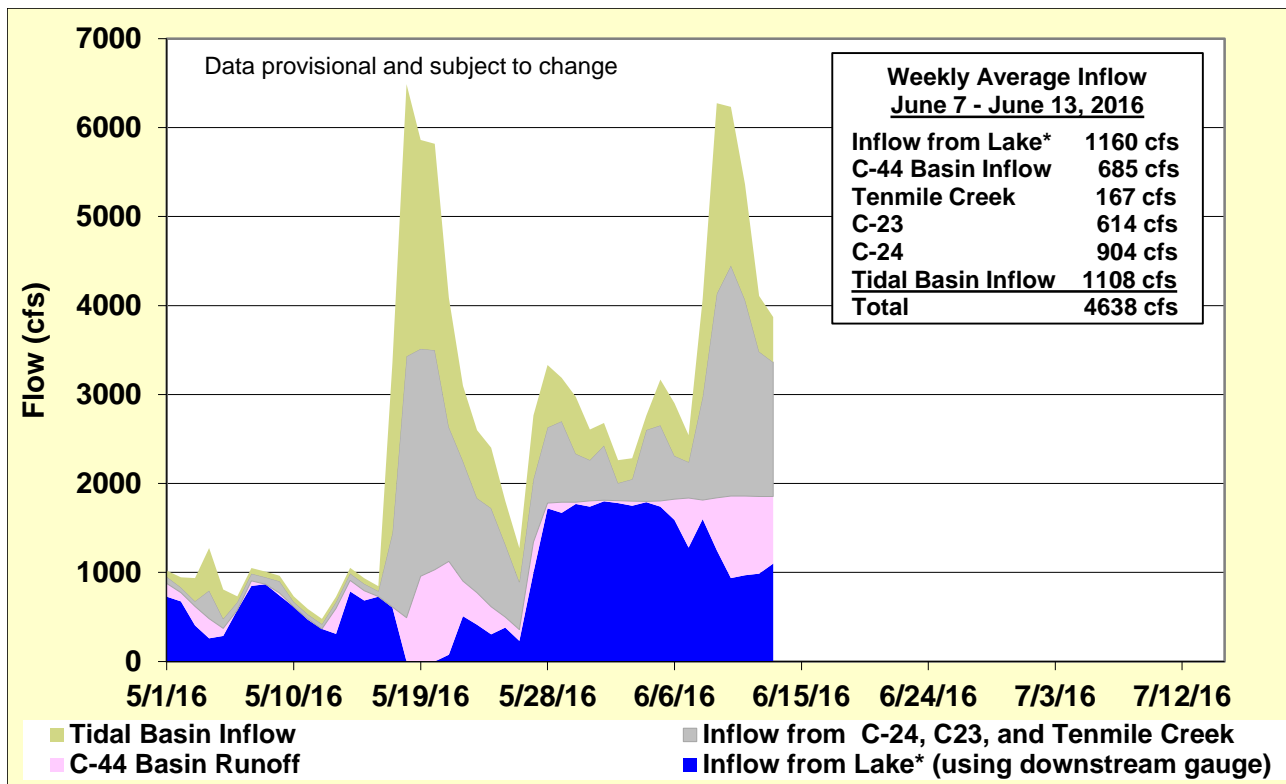


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

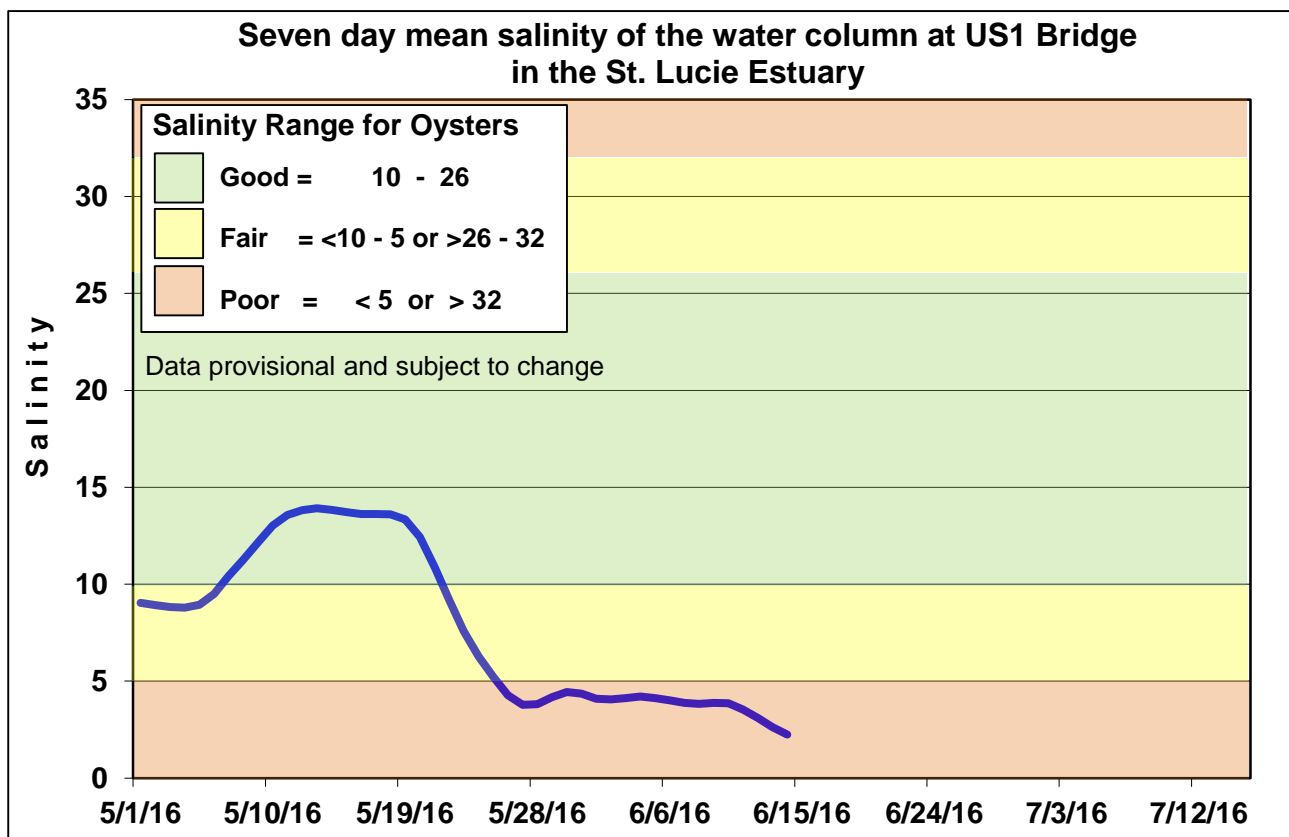


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

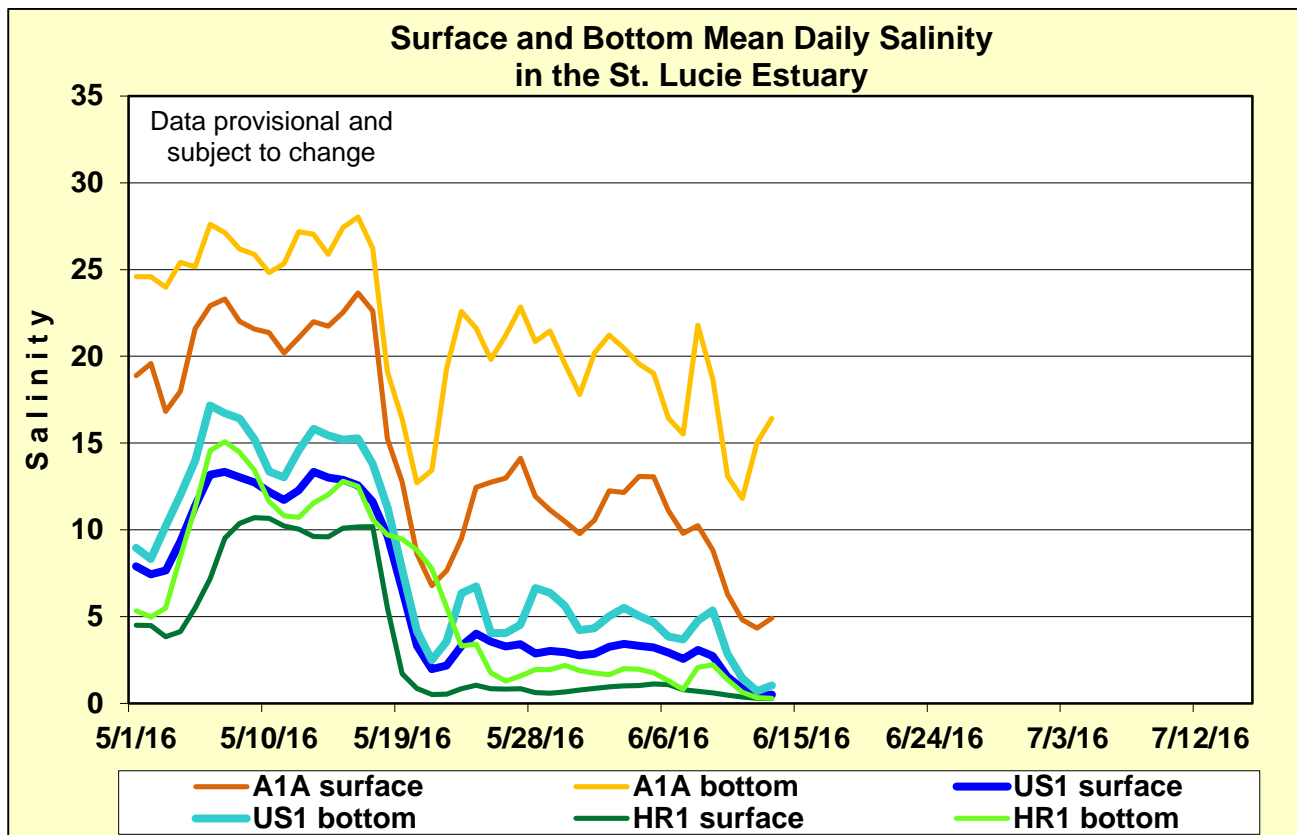


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

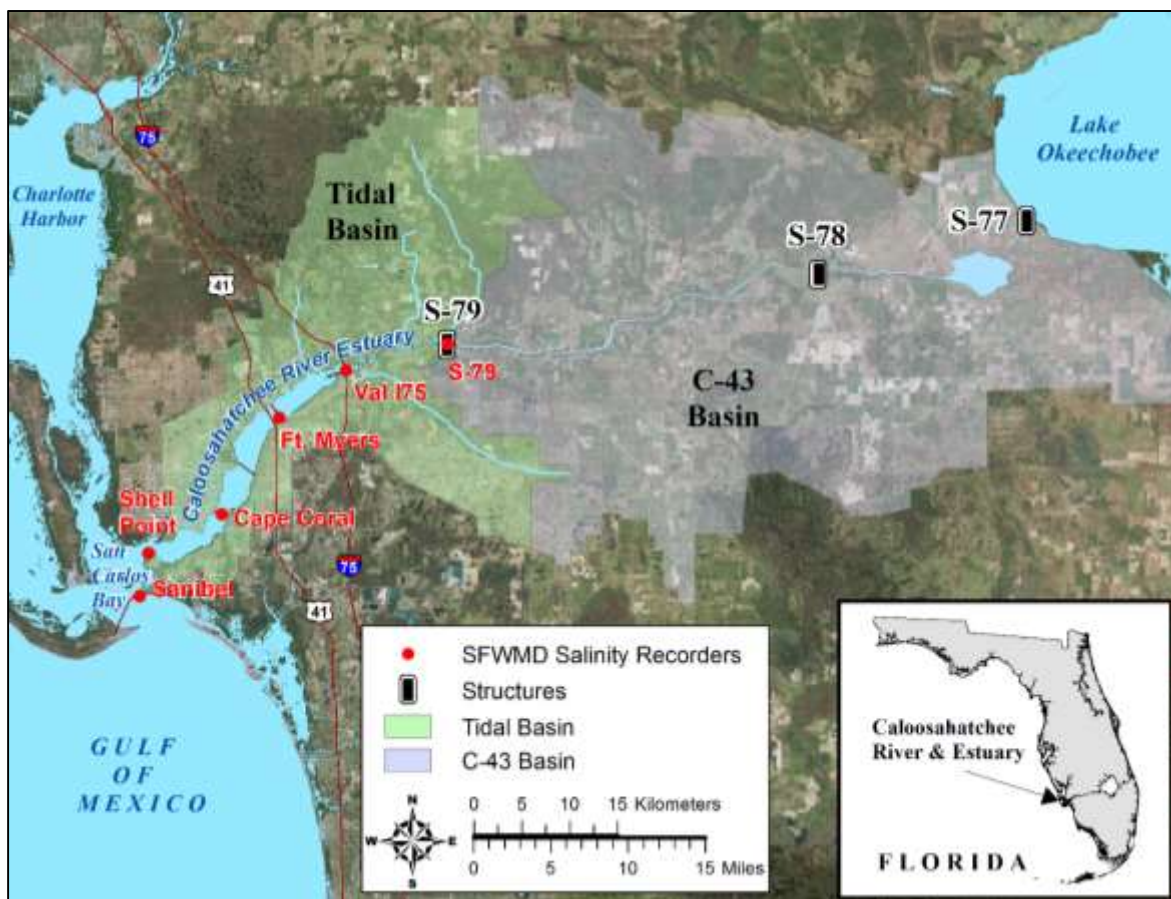


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

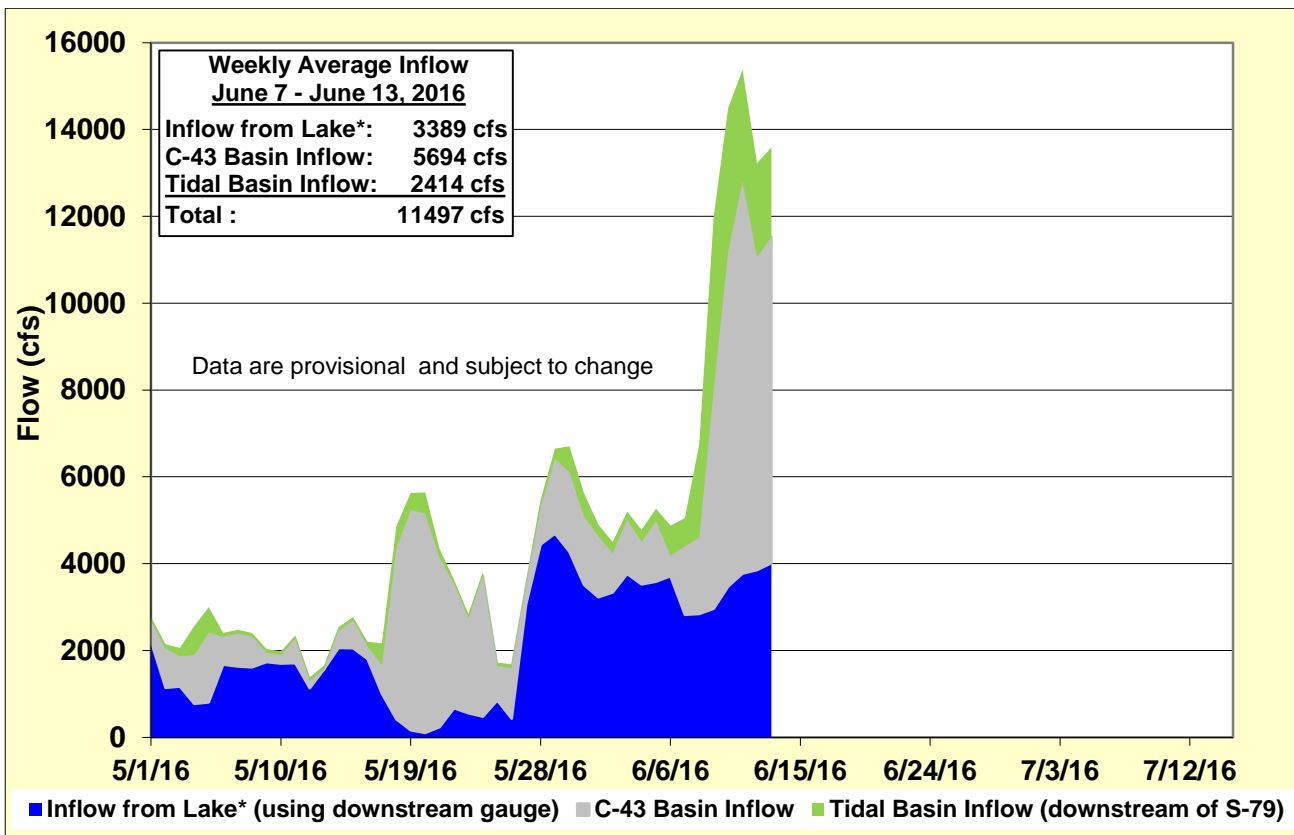
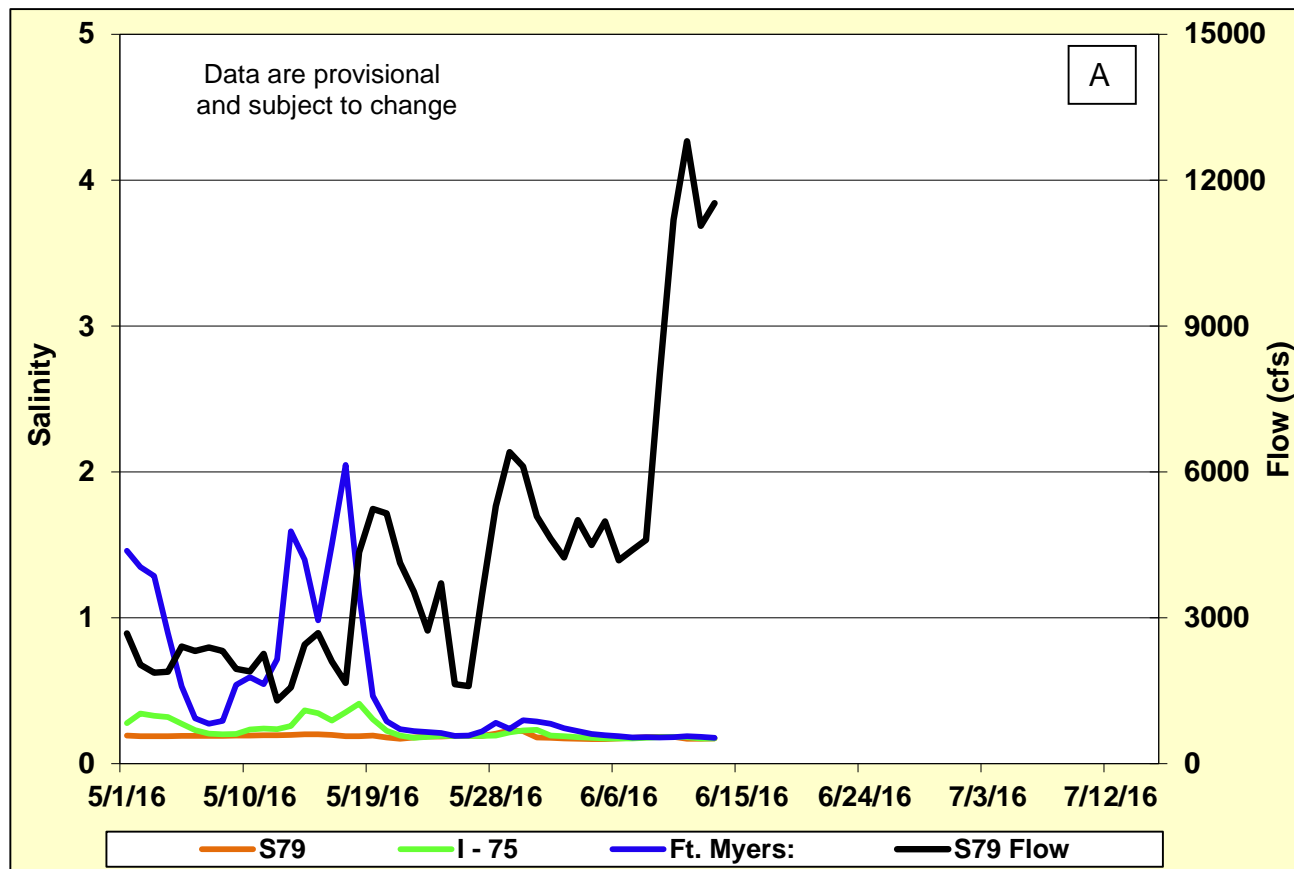


Figure 6. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.



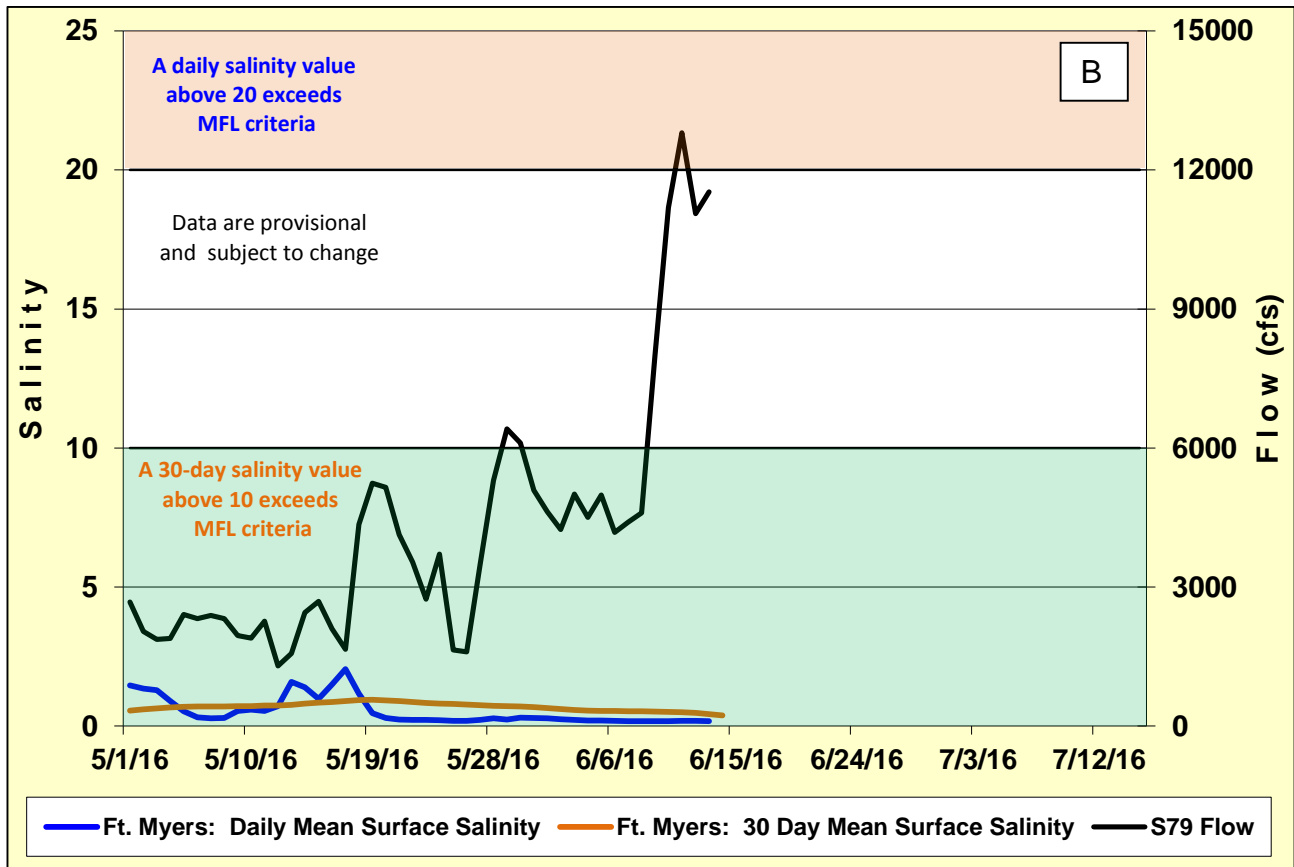


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

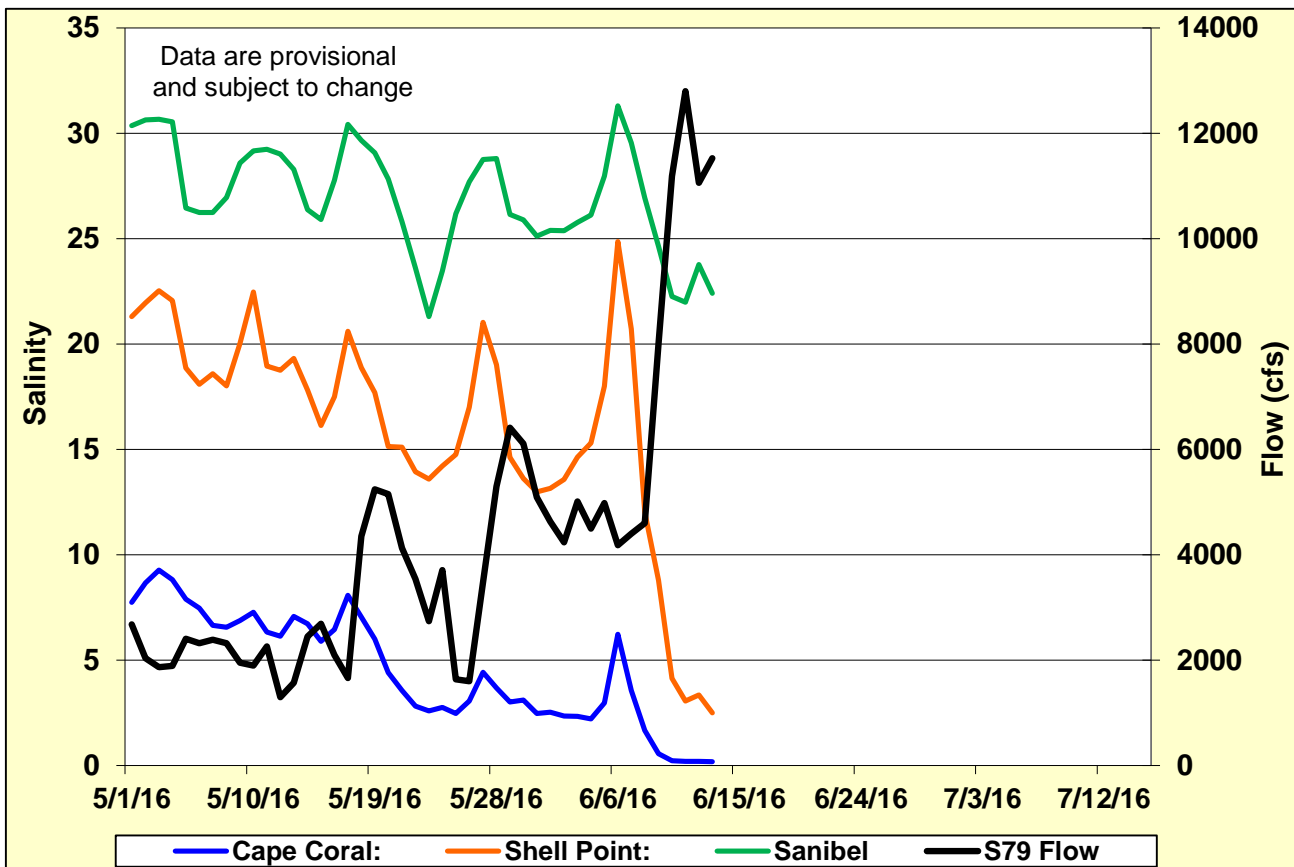


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

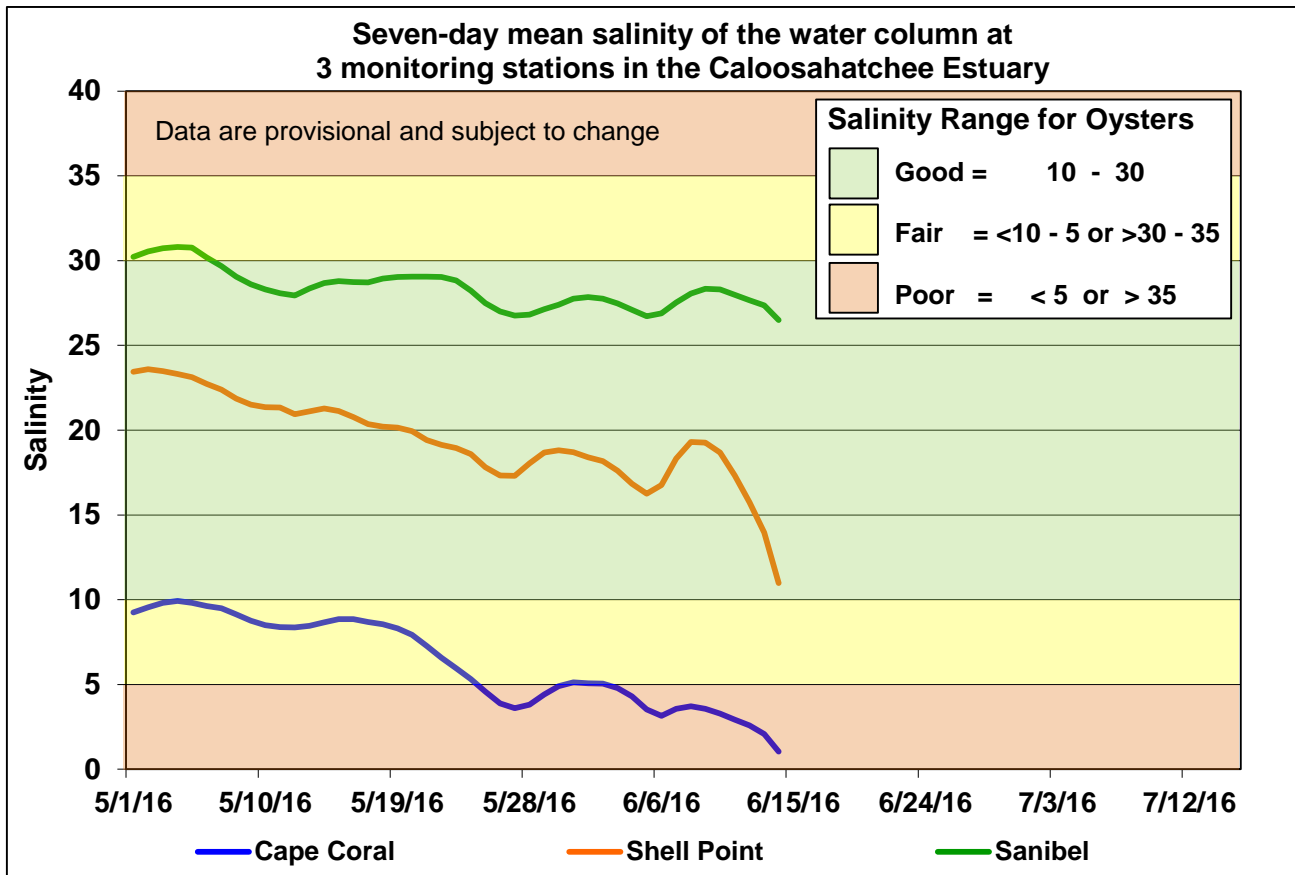


Figure 9. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

## **GREATER EVERGLADES**

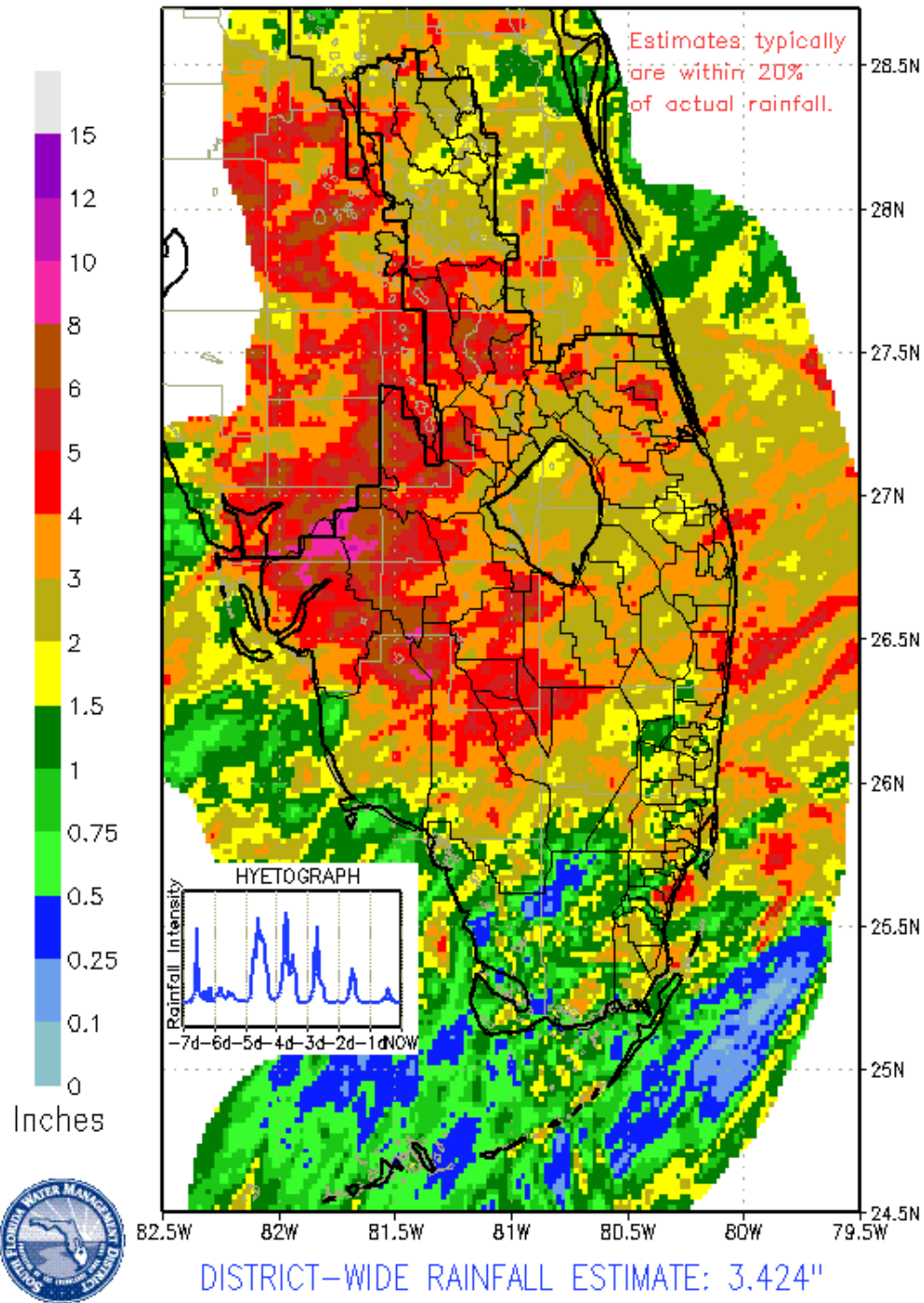
Rainfall was high last week with basin averages exceeding an inch throughout the Everglades; WCAs 1, 2A and 3A totals were 2.5 inches or more. The local maximum rainfall (6.19 inches) occurred in WCA-3A. Pan evaporation was close to the pre-project average (1.52 inches compared to 1.55 inches average).

| Everglades Region | Rainfall (Inches) | Stage Change (feet) |
|-------------------|-------------------|---------------------|
| WCA-1             | 2.73              | 0.20                |
| WCA-2A            | 2.50              | 0.03                |
| WCA-2B            | 1.24              | 0.04                |
| WCA-3A            | 2.91              | 0.13                |
| WCA-3B            | 1.94              | 0.04                |
| ENP               | 1.17              | -0.09               |

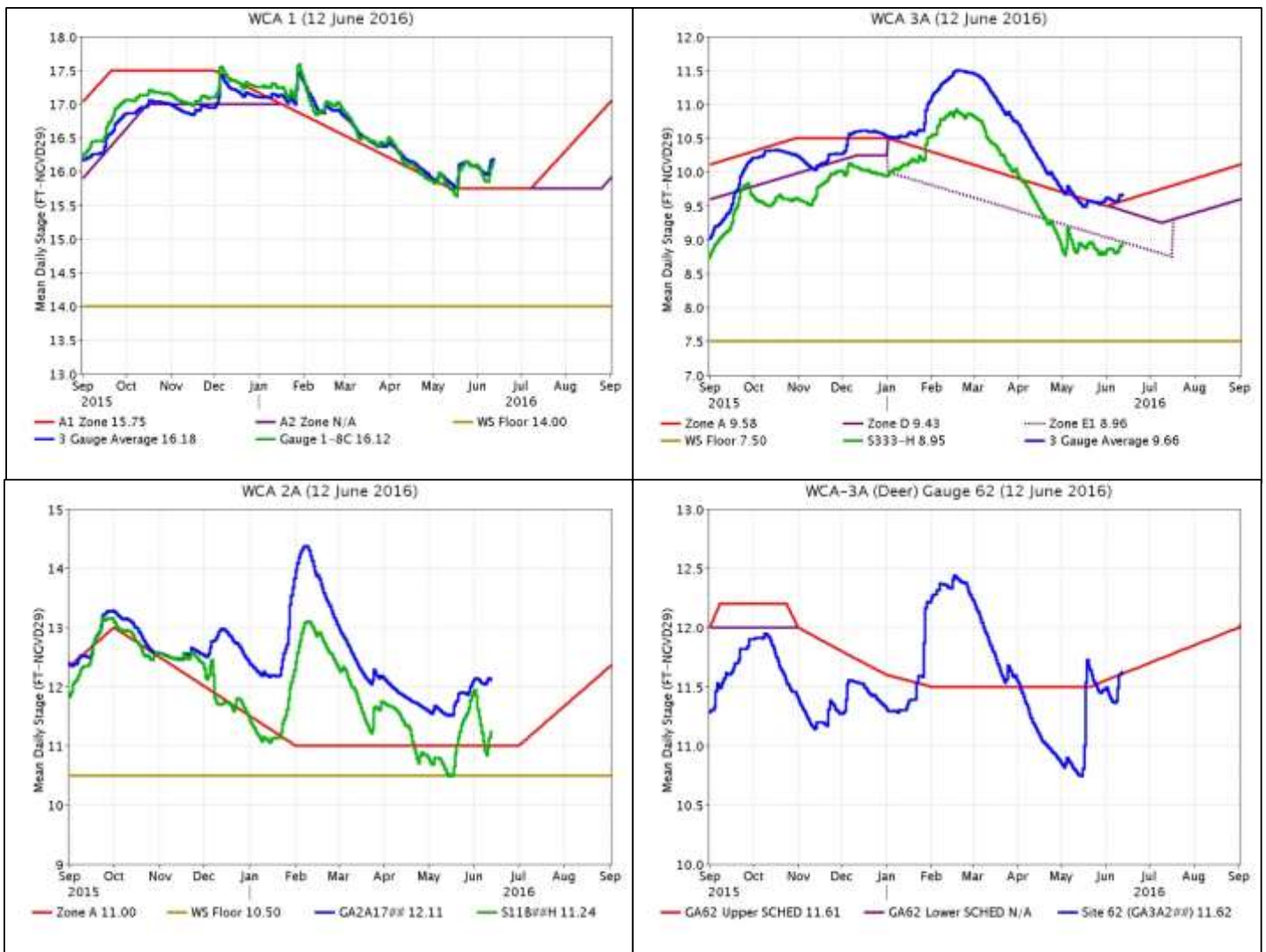


# SFWMD PROVISIONAL RAINDAR 7-DAY RAINFALL ESTIMATES

FROM: 0515 EST, 06/06/2016 THROUGH: 0515 EST, 06/13/2016

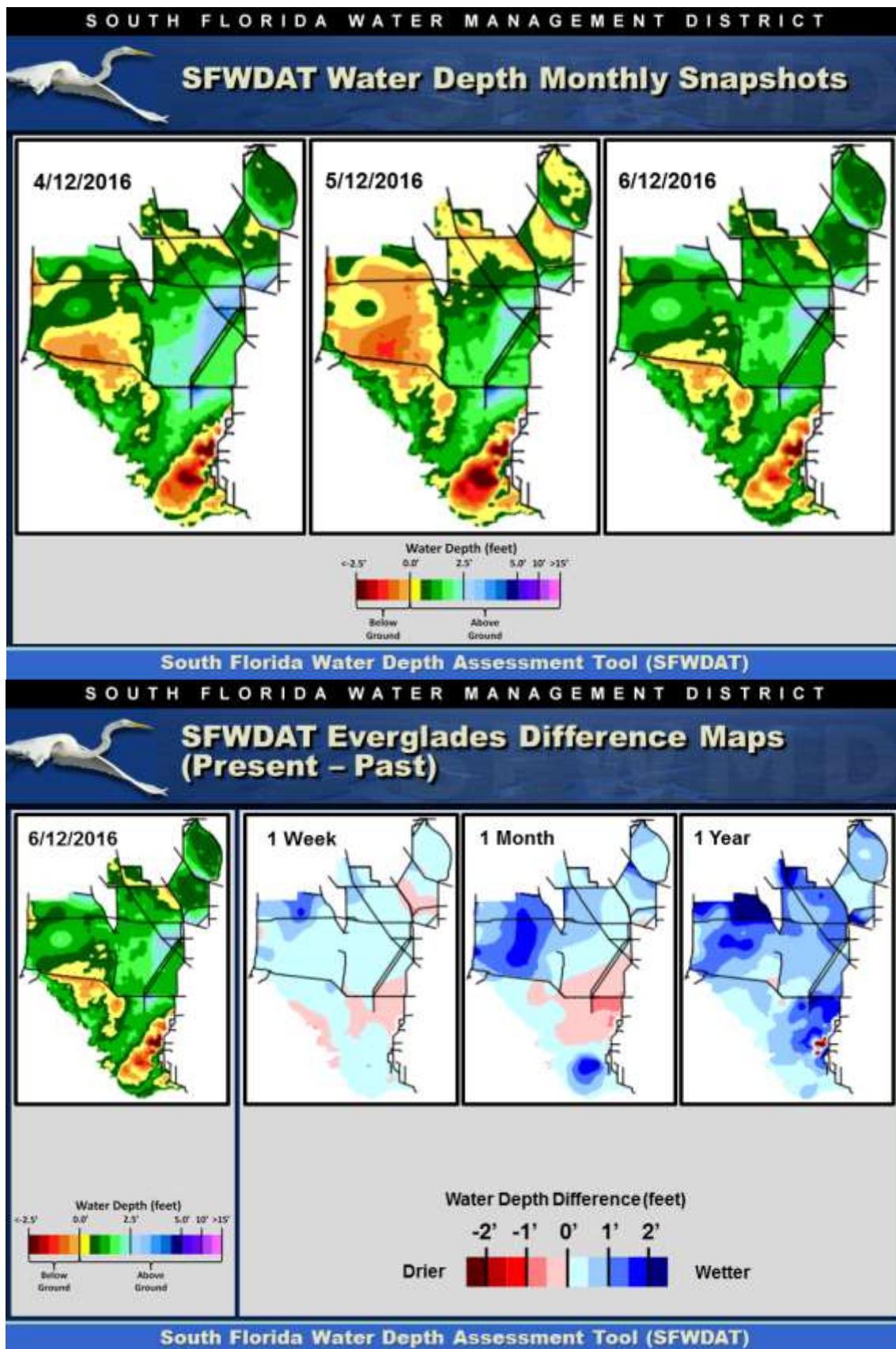


Regulation Schedules: Water levels rose at all regulation schedule gauges with the week's rainfall. The WCA-1 three-gauge average is 0.43 feet above regulation. The WCA-2A stage rose to 1.11 feet above regulation, and WCA-3A three-gauge average stage is 0.08 feet above regulation. The northwestern WCA-3A gauge stage (gauge 62) rose rapidly to 0.01 feet above schedule.



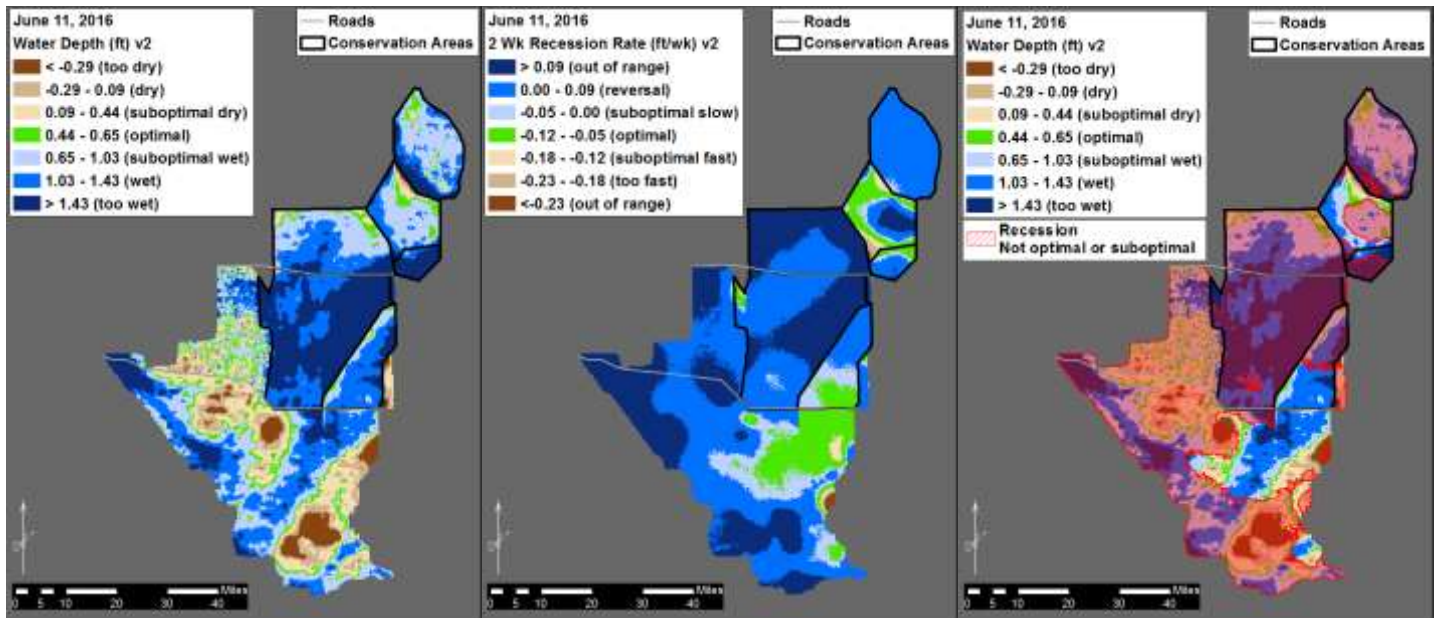
**Water Depths and Changes:** Water levels are higher than a month and two months ago with last week's rainfall. Water depths at the monitored gauges (except WCA-2B) range from 0.95 feet to 1.71 feet (in southern WCA-3A).

Stages rose last week except in parts of WCAs 2 and 3B and in northern Everglades National Park (ENP). Gauge changes ranged from -0.09 feet to 0.27 feet. Compared to a month ago, stages are higher except for southern WCA-3 and northern ENP. All areas are 0.5 feet to over two feet higher than a year ago.



Wading birds: Foraging conditions are poor. Any remaining nesting birds must rely on foraging sites outside the WCAs.





Cape Sable Seaside Sparrows: The percent dry area is smaller than last week.

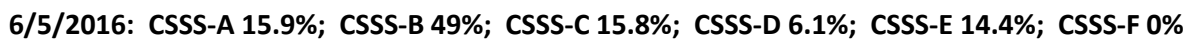
#### Survey results:

Subpopulation A: The Shark Valley plot has eight territories with three females and one active nest. Two fledglings were observed and the parent birds may be constructing a possible second nest. Water levels are very low.

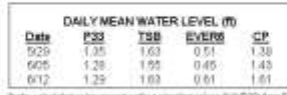
Subpopulation B: Dogleg plot has males on five or six territories with two nests (one was depredated and the other has three nestlings); in Alligator Hammock plot there were 16 males and two females observed. Water levels are above ground.

Subpopulation C: This area's surveys have been completed.

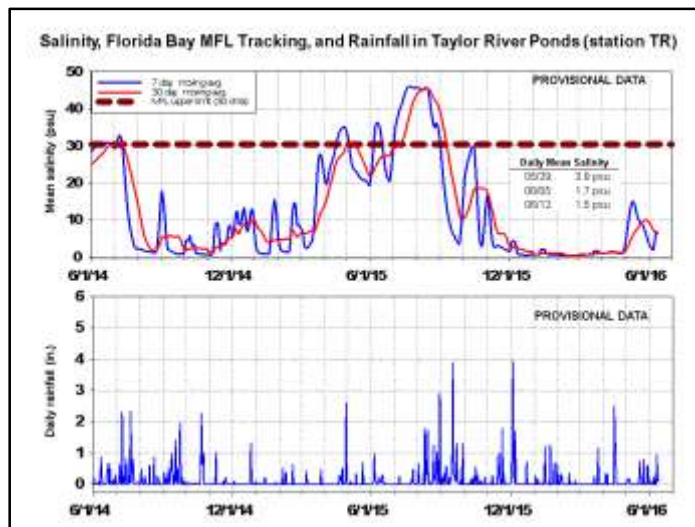
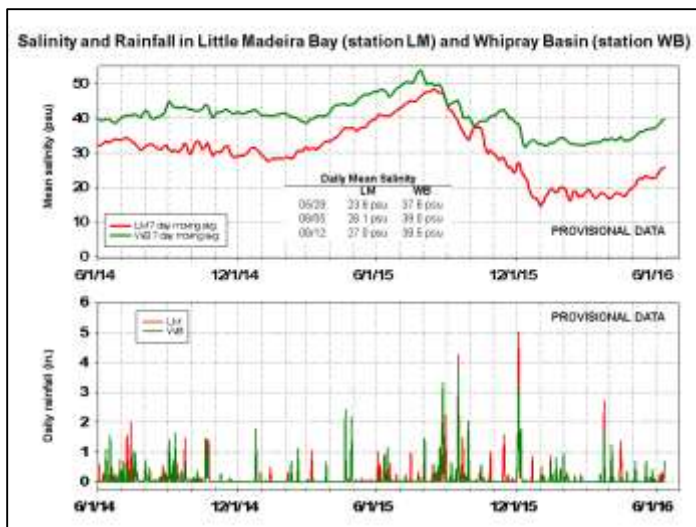
Subpopulation D: This area has been too treacherous to survey. The crew may return there at the end of the breeding season.



Upstream in the mangrove ecotone, the daily average salinity at TR, the MFL sentinel site, rose to 14 psu mid-week before dropping to 1.5 psu, well below the seasonal average of 20 psu. The 30-day moving average salinity at TR decreased to 6.2 psu and is expected to continue to decrease through the wet season.

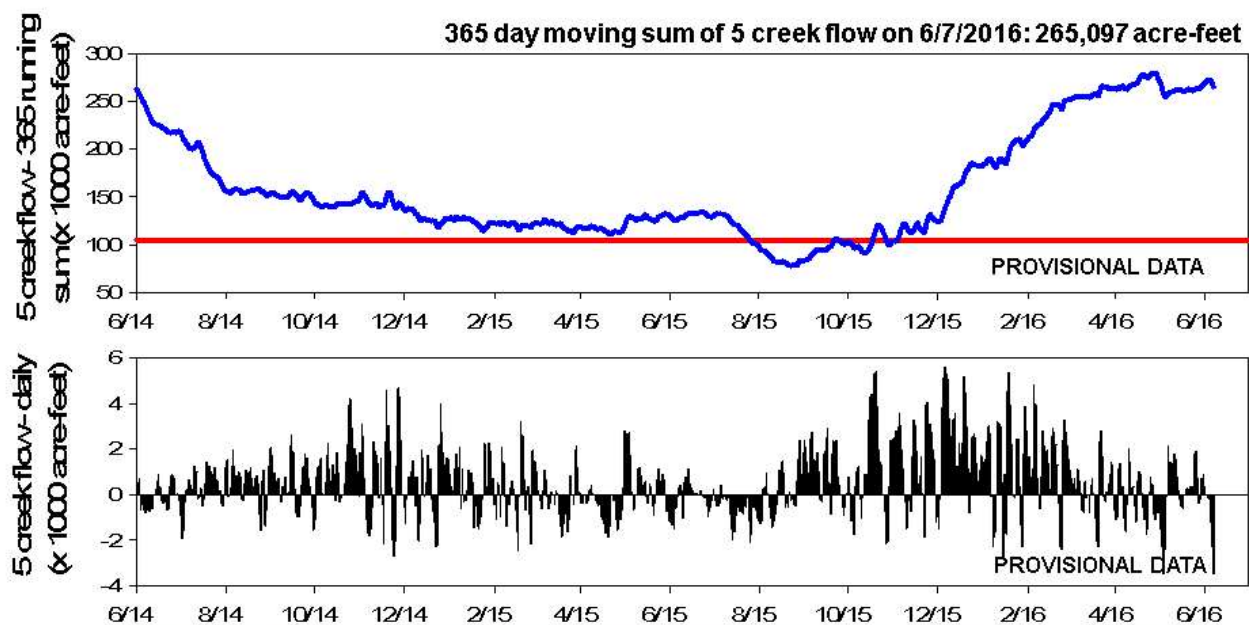






The 365-day running summed cumulative flow from the five creeks feeding Florida Bay decreased very slightly to 265,097 acre-feet by June 8, when one of the USGS gauges used for these metrics went off-line. Creek flow is provisional data from the USGS and is highly variable.

### 5 Creek Cumulative Flow and Florida Bay MFL Flow Criteria Tracking



## Water Management Recommendations

- Foraging conditions in the Everglades are poor. Recession rates of –0.05 feet to –0.12 feet per week would be optimal, but if recession cannot be attained, ascension rates should not exceed 0.25 feet per week.
- Lower stages throughout the WCAs are ecologically necessary for ecosystem improvement through June. For the upcoming wet season, water depths should remain below 2.5 feet through far southern WCA-3A to protect tree island forests.
- Water levels in the Cape Sable Seaside Sparrow habitats are high and need to continue to recede. Sparrows in dry areas are still courting and may be attempting to nest a second time.

Recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

| Everglades Ecological Recommendations, June 14, 2016 (red is new) |  |                                      |  |   |
|---|--|--------------------------------------|--|---|
| Area  | Current Condition                                  | Cause(s)                             | Recommendation   | Reasons   |
| WCA-1   | Stages rose 0.17' - 0.23'                          | Rainfall, ET, management             | Limit ascension rates to extent possible with a maximum of no more than 0.25 ft/week.  | Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.  |
| WCA-2A  | Stage rose 0.03'                                   | Rainfall, ET, management             | Begin wet season operations for this area, including maintaining ascension rates <0.25 ft/week   | Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.  |
| WCA-2B  | Stages increased 0.02' - 0.05'                     | Rainfall, ET, management             | Follow normal seasonal practices. Limit ascension rates to extent possible with a maximum of no more than 0.25 ft/week.  | Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.  |
| WCA-3A NE   | Stage rose 0.07'                                   | Rainfall, ET, management             | Limit ascension rates to extent possible with a maximum of no more than 0.25 ft/week.  | Supporting wading bird foraging is especially critical as this area contains the only remaining nesting wading birds. Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.  |
| WCA-3A NW   | Stage rose 0.27'                                   | Rainfall, ET, management             |  |   |
| Central WCA-3A S  | Stage rose 0.14'                                   | Rainfall, ET, management             | Limit ascension rates to extent possible with a maximum of no more than 0.25 ft/week. Water depths should remain below 2.5 feet over this upcoming wet season. When flows are changed a gradual reduction is recommended (stepping down over several days).  | Moderate recession rates would benefit habitat and wildlife. Keeping depths below 2.5' is important to allow tree island vegetation to recover from stress of the recent extended inundation duration. Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails. |
| Southern WCA-3A S   | Stage rose 0.04'                                   | Rainfall, ET, management             |  |   |
| WCA-3B  | Stages changed –0.04' to 0.11'                     | Rainfall, ET, management             | Follow normal seasonal practices. Limit ascension rates to extent possible with a maximum of no more than 0.25 ft/week.  | Ascension rates of 0.25'/week will protect habitat and wildlife including reproducing apple snails.   |
| ENP-SRS   | Stage decreased –0.09'                             | ET, rainfall, topography, management | Make discharges to the Park according to the ERTTP rainfall plan.  | Keep peat wet to promote native habitat and maintain wetland plant and animal communities.  |
| ENP-CSSS habitats   | S-12A and S-12B remain closed to enhance dry-down. | Rainfall, ET, management             | Follow rainfall plan for releases. Adhere to ERTTP closures for S12-A and B. Gradual reduction in flows through S333, S12C and D, as possible, is recommended (stepping down over several days). Reduced flows through S333 would benefit wildlife. Follow guidance in C-111 western spreader canal project operations manual. | Provide appropriate hydrological and habitat conditions for Cape Sable Seaside Sparrow breeding.  |
| Taylor Slough   | 6-16 inches above average                          | Rain, ET, inflows                    | Move water southward as needed   | Provide freshwater buffer for ecosystems and maintain low salinity conditions downstream  |
| FB- Salinity  | –8 psu below to +4 psu above average               | Rain, ET, inflows, wind              | Move water southward as needed   | Maintain lower salinity levels.   |